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DETROIT MEDICAL JOURNAL

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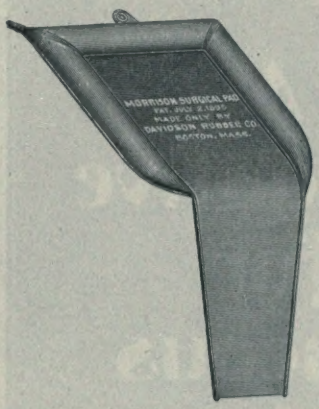

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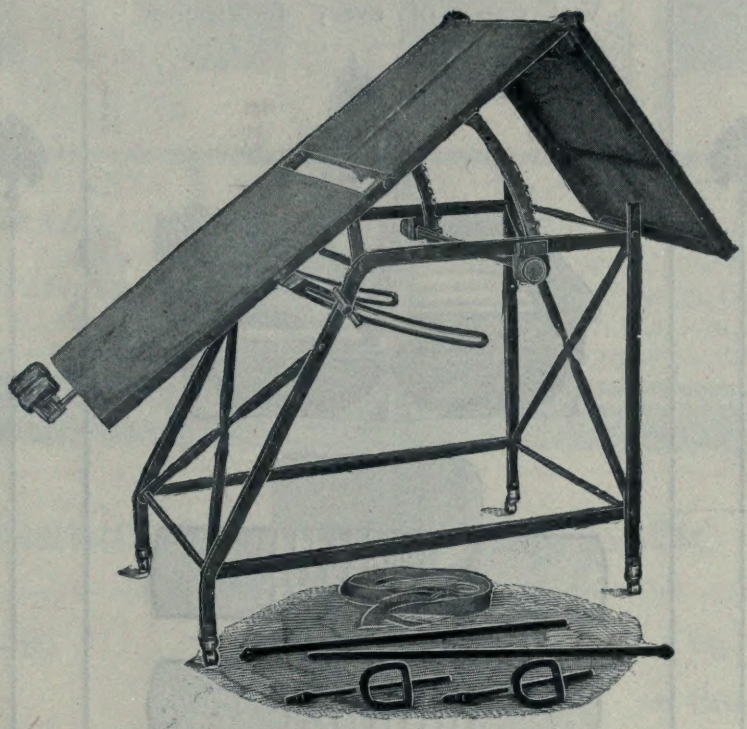

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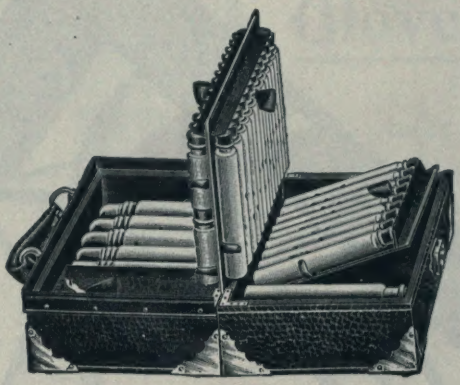

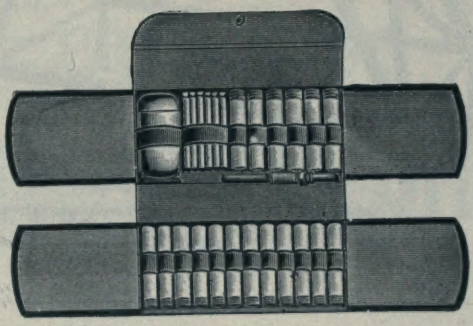

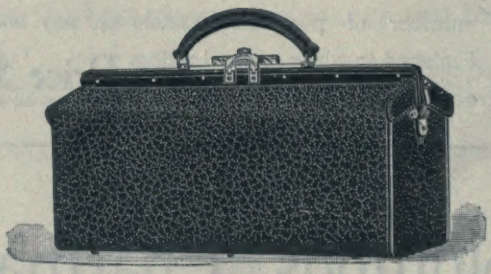

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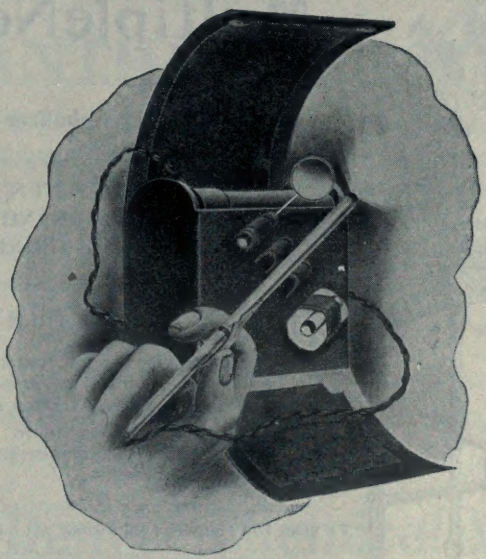

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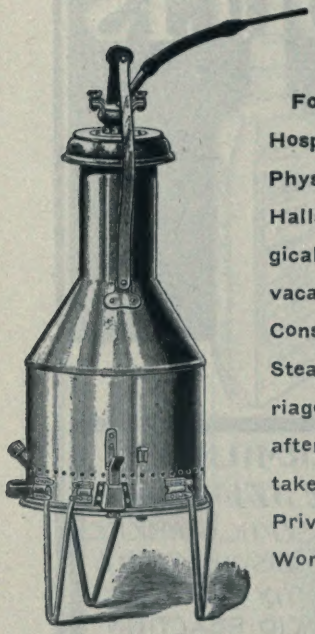

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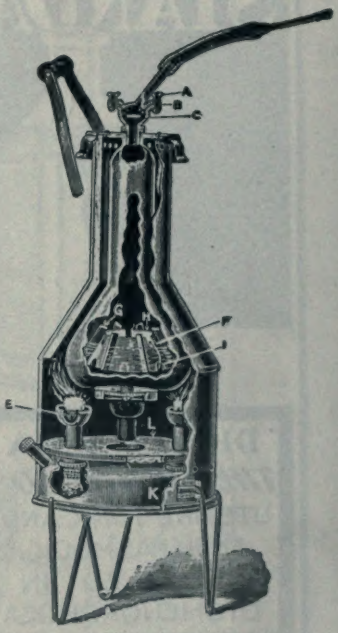

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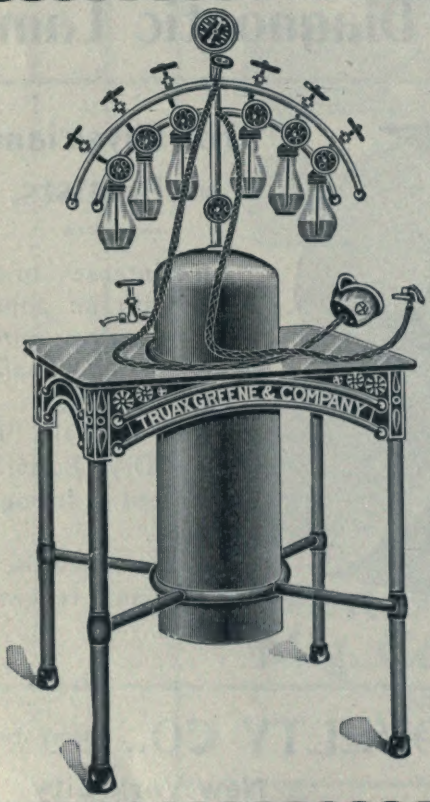

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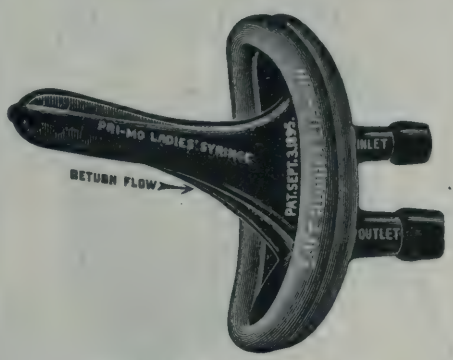

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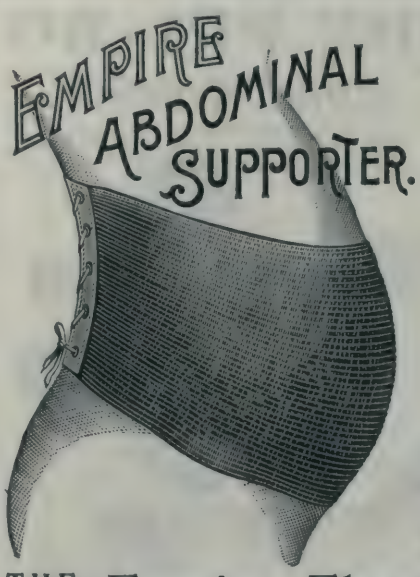

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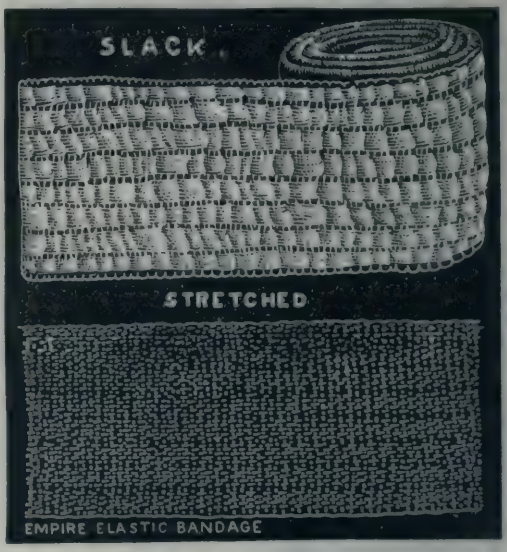

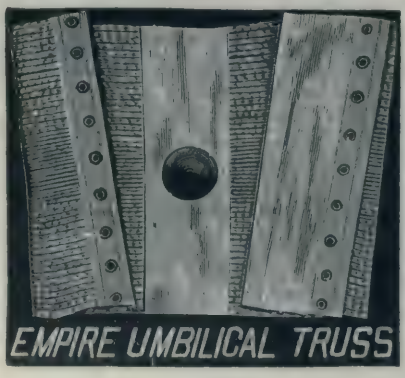

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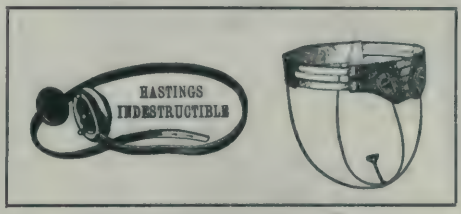

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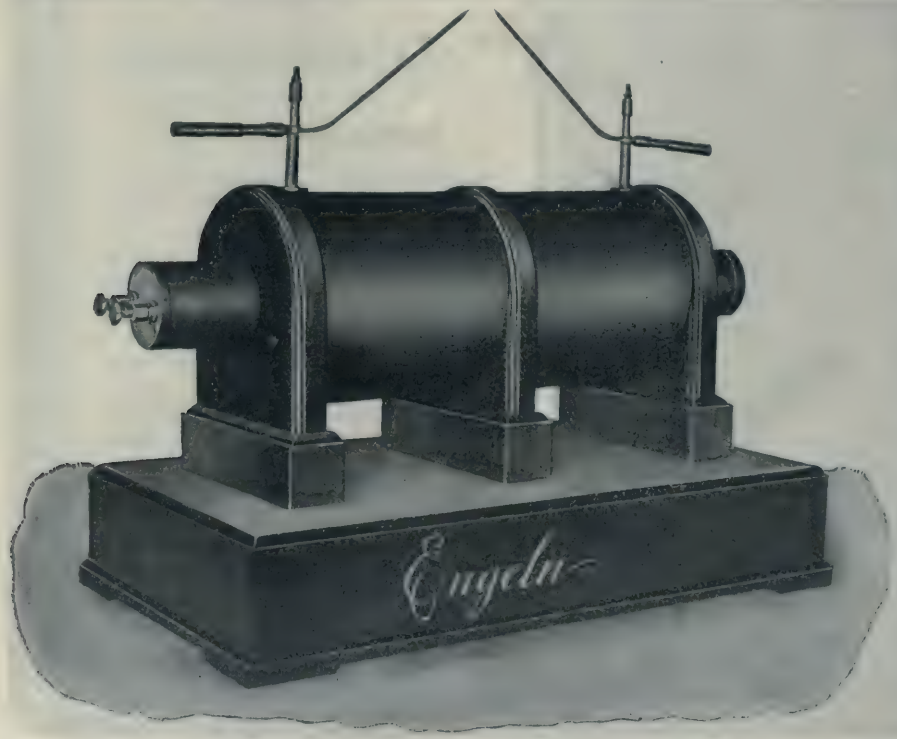

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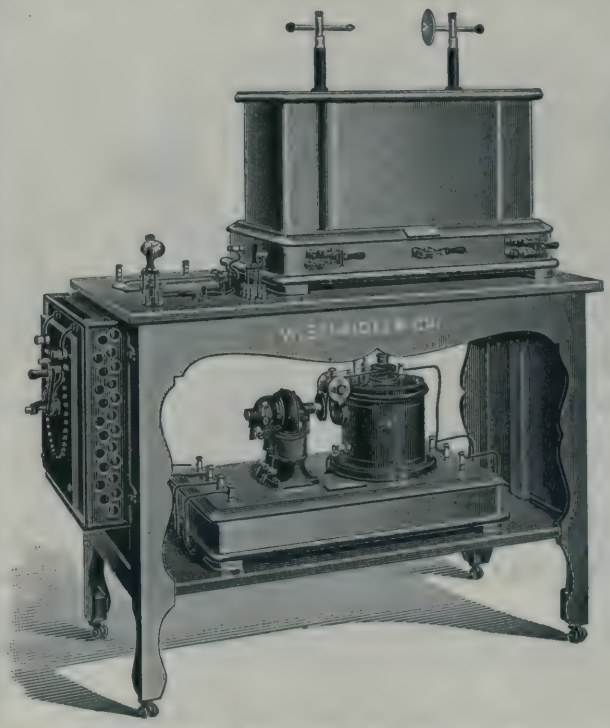

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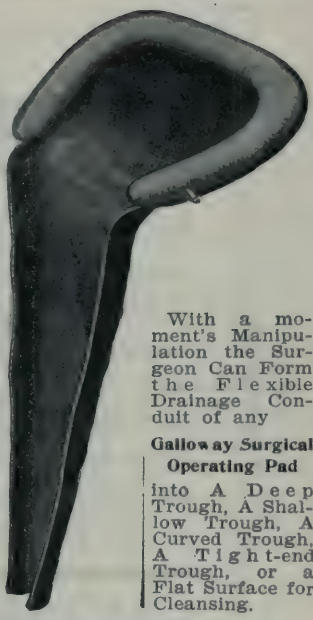

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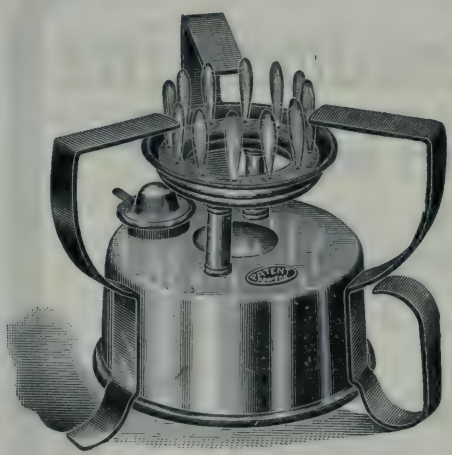

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THE DETROIT MEDICAL JOURNAL.

VOL. III. MAY, 1903 No. 2.

ON THE BLOOD PRESSURE IN SURGERY.*

By GEORGE W. CRILE, M. D.,
Cleveland, Ohio.

The study of the effect of operations, injuries, drugs and disease upon the blood-pressure is a natural sequence of medical science, and seems to be one of the leading features of the trend of medicine of to-day. Physiology is vying with anatomy and pathology as a practical and useful branch of medicine. Although the methods of determining the blood-pressure as yet only approximately accurate, much useful and reliable information may be obtained. The sphygmo-manometer often gives information that could not otherwise be secured.

In scarcely any other condition is the use of this instrument more important than in shock and collapse. Since these play so important a role in both medicine and surgery, some of the more recent studies on these subjects will be first considered. Blood-pressure determinations in the operating-room and in certain acute infectious complications are of importance and some considerations of shock and collapse may give point to the clinical observations to be given later on.

Collapse.

For the purpose of this paper the term collapse is applied to the cases of the more sudden fall of the blood-pressure from hemorrhage, from asphyxia, from injuries of the vaso-motor center, or from failure of the cardiac action. These conditions represent suspension of function rather than exhaustion of centers. There being no exhaustion, stimulants may be of value. As an illustration:—If one animal is subjected to such a degree of shock (exhaustion of the vaso-motor center) as to produce a sufficient accumulation of the blood in the veins (intravenous hemorrhage) to cause a decline in the blood-pressure to 24 mm., and if another animal is subjected to an extravascular or ordinary hemorrhage, until the blood-pressure has been reduced an equal degree, it would be impossible, on the symptoms alone, to make a differential diagnosis. Yet, in the one case, stimulants could have no effect because the vaso-motor center is exhausted, and in the other the effect might be marked because the center is not exhausted. In the animal with the exhausted vaso-motor center (or shock), saline solution could be of little assistance, but in the animal subjected to ordinary hemorrhage, and having a normal vaso-motor center, saline infusion might be of marked assistance. In collapse, direct therapeutic stimulants may be extremely useful.

Shock.

In shock the essential phenomenon is a diminution of the blood pressure. Since there are no demonstrable lesions in the fatal cases, and no later effects in those that recover, we will assume exhaustion, rather than structural lesion, to be the cause of this fall. It must, then, be an exhaustion of the cardiac muscle, of the cardiac centers, of the nerve muscular mechanism, of the blood vessels or of the vaso-motor center.

(a) Is it due to fatigue, or exhaustion of the cardiac mechanism? The heart, as an organ, is noted for the large amount of labor it may perform without fatigue. In shock, on account of the diminished blood-pressure, there is even less work for the heart muscle to do than in the normal state. In a series of experiments after the animal had been reduced to a degree of shock, presumably fatal, the blood-pressure was, by special means,

*Read before the Wayne County Medical Society, April 23, 1903.

raised much higher than normal. The heart then performed its normal function. There was then no material fatigue of the heart muscle.

(b) Is there fatigue of the cardio-inhibitory center? In experiments in which the animal had been reduced to a degree of shock, presumably fatal, the blood-pressure was by special means raised to the normal; then, on manipulation of the laryngeal mucosa, a normal reflex inhibition of the heart was induced. The cardio-inhibitory center, and its peripheral nerve mechanism were, therefore, not exhausted. That the cardio-accelerator mechanism remains active in every degree of shock, is constantly evidenced by the increasing rapidity of the heart until the inauguration of the phenomena of death. In a series of experiments, the heart was isolated from the nervous system by severing both vagi and both accelerantes; shock in such animals was as readily produced as in the centrals. We may then exclude the heart and its nerve mechanism as factors in the primary causation of shock and look to the loss of peripheral resistance as the essential factor. The loss of peripheral resistance may be due to (a) An exhaustion of the peripheral nerve vascular mechanism,—the anatomical periphery, or (b) An exhaustion of the vaso-motor center. In a series of experiments in which both vagi and both accelerantes had been severed, a physiologic dose of curare given, and artificial respirations maintained, the animals were reduced to such a degree of shock that the vaso-motor center gave the usual physiologic proof of exhaustion. Varying doses of adrenalin were then given. The blood-pressure rose proportionally to the dose, even much higher than the normal. Fatigue of the blood-vessels may then be excluded. That the vaso-motor center becomes exhausted in complete shock, is indicated by the absence of any rise in the blood-pressure on electrical stimulation of the sciatic nerve, or burning of the paw, or by giving a physiologic dose of strychnin, or by deepest asphyxia, each of which causes stimulation of the vaso-motor center. Cocainizing the vaso-motor center, or severing the cord just below the medulla, causes a fall in the blood-pressure to about the same level as that of profound shock. We may then conclude that shock is essentially an exhaustion or break-down of the vaso-motor center. From this standpoint then let us consider the vaso-motor stimulants such as strychnin. In forty-eight experiments, it was found that strychnin in therapeutic doses does not cause a rise in the blood-pressure. In another series in which the dose was gradually increased until the convulsive stage was reached, a remarkable rise occurred. Was this rise due to the muscular contractions of the convulsions? No, since an equal or greater rise occurred when convulsions were prevented by preliminary injections of curare; the centers presiding over the vaso-muscular system and voluntary muscular system seem to be equally susceptible to the action of strychnin. Was the rise partly due to a simultaneous stimulation of the heart? No, since strychnin caused an equal rise in the blood-pressure in animals, in which both vagi and bth accelerantes had been previously severed, thereby isolating the heart, and a paralyzing dose of curare given. It was, therefore, a pure vaso-motor stimulant. A brilliant stimulant indeed, sometimes doubling the normal blood-pressure and lasting from thirty minutes to several hours. Each succeeding physiologic dose caused less effect and after from two to four doses, no appreciable effect was obtained. The blood-pressure in the meantime had fallen, and at last had reached the same level as in most profound shock. It was at this stage, not possible by reactions, such as electric stimulation of the sciatic nerve, burning of the paw, by deepest asphyxia, or by a study of the terminal tracings, to distinguish between these animals and the animals in profound traumatic shock. The vaso-motor center in each was exhausted. It was, in effect, shock produced by strychnin. The effect upon the function of the vaso-motor center seemed to be the same, whether the stimulation was mechanical and external, as in injuries or operation, or internal, as from strychnin. Conversely, in a series of experiments in which strychnin was given in various degrees of shock in such dosage as to cause a stimulation, the effect was proportional to the degree of shock,—i. e., when but little shock was

present, a marked effect from strychnin was obtained, and when most profound there was no effect. In the intervening degrees, the effects were proportional, but after giving the strychnin, the animals not yet in complete shock always passed into a deeper degree of shock. Later in the research, it is found that the most convenient and certain method of producing shock for experimental purposes, is by the administration of physiologic doses of strychnin. The treatment of shock, then, by therapeutic

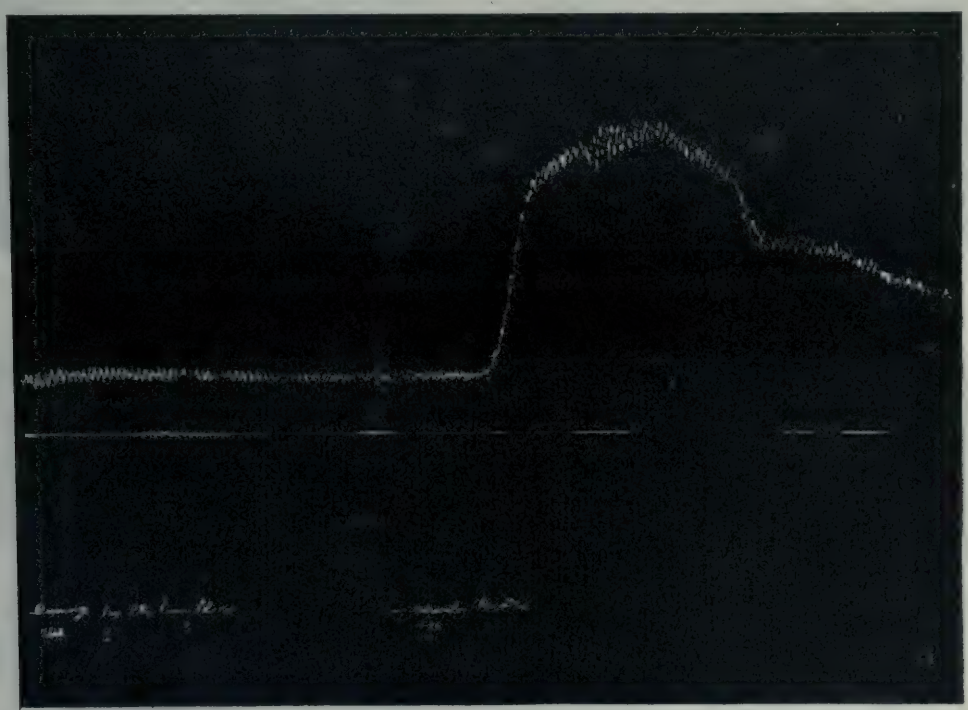

Fig. I. ETHER-CURARE.—Animal reduced to profound shock. Burning the paw, stimulating the sciatic nerve and administering physiologic doses of strychnin caused no change in the blood-pressure. After this the blood-pressure was raised higher than normal by injecting adrenalin.

doses of strychnin is inert, and in physiologic doses dangerous. It then follows that treatment of shock by vaso-motor stimulants in the form of drugs, is on precisely the same basis as treatment by burning the animal or crushing his paws, or by subjecting it to injury or operation,—it would seem to be as reasonable to treat strychnin shock by administering traumatism as traumatism by strychnin.

What has been said of strychnin may be assumed to apply equally well in the case of other stimulants of the vaso-motor center. Turning to cardiac stimulants, we must first consider how much influence upon the blood-pressure an increase in the force and frequency of the heart-beats has. Even in normal animals, when the peripheral resistance is at its best, an increase in the force and frequency of the heart-beats has but a limited effect in increasing the blood-pressure. In a series of experiments in which the vaso-motor center was reduced to varying degrees of exhaustion, and the vagi severed—thereby increasing the force and frequency of the heart-beats—the rise in the blood-pressure sustained an inverse ratio to the degree of exhaustion, and in the cases in which the vaso-motor center was entirely exhausted, the blood-pressure was not raised by an increase of the force and frequency of the heart-beats. An artificial circulating apparatus was then arranged so that the peripheral resistance was represented by the atmospheric pressure in a cylinder which contained an elastic bag filled with water and communicating by means of tubing with an artificial heart on the out-

side. In this rough way the force and frequency of the heart-beats, and the peripheral resistance could be increased or diminished at will. It was not possible by any increase in the force and frequency of the artificial heart-beats, to raise and maintain the artificial blood-pressure more than 10 mm. The velocity of the circulation was, of course, much increased. On the other hand, any change in the peripheral resistance was attended by an equal change in the blood-pressure. From the standpoint of physics, as well as physiology, it would seem that the peripheral resistance (vaso-motor action) fixes the gauge for the height of the blood-pressure, while the heart supplies the force necessary for circulating the blood. This would leave but a limited range of possibilities for heart-stimulants.

In another series of experiments, cardiac stimulants, particularly digitalis, were tested. It was found that as the peripheral resistance was lowered, the effect upon the blood-pressure was diminished and when complete exhaustion of the vaso-motor center existed, the cardiac stimulants had no influence whatever upon the blood-pressure. Other drugs which are, in practice, generally included in the class of stimulants, such as alcohol and nitro-glycerin and amyl nitrite were studied at length. No justification could be found for classifying these drugs as stimulants. In the case

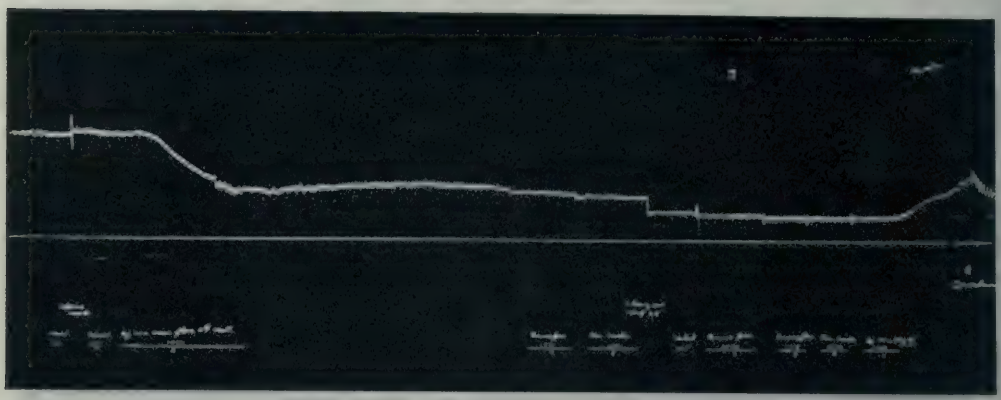

Fig. II. MEDULLA COCAINIZED.—Note the resemblance between this curve and that of profound shock.

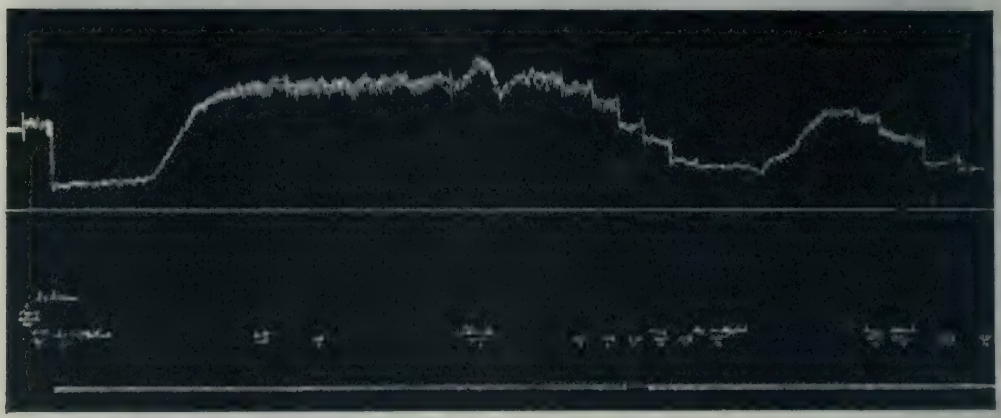

Fig. III. BOTH VAGI AND ACCELERANTES SEVERED.—On injecting curare a great fall in the blood-pressure occurred. The animal was in COLLAPSE, not SHOCK. Note the striking effect of injecting strychnin. Note also the lesser effect on injecting the second dose, and no effect in later injections.

of alcohol, in not a single instance was there a sustained improvement in the blood-pressure, or in the respiration. On the contrary, the most constant and the most marked effect upon the blood-pressure was a decline. The rapidity and the extent of the decline were proportional to the depth of the shock, and the dosage of alcohol. In all the experiments upon nitro-glycerin, when any effect was noted, it was an immediate fall in the blood-pressure. This occurred in every degree of shock. A compensatory rise equal to the fall followed in most instances. The rising curve was usually more gradual than the falling. Most of the animals showed a marked degree of toleration. On the whole, nitro-glycerin acted unfavorably in shock. As in digitalis and alcohol, when considerable dosage had been given, the final break-down of the circulation was more sudden than in the control animals.

If the foregoing be true, it is obvious that in true shock the use of stimulants acting upon the vaso-motor, the cardiac and other centers of the medulla, are either inert or harmful. In considering other mothods of controlling the blood-pressure, normal saline solution demands consideration. Normal saline administered intravenously or subcutaneously, is a purely mechanical aid to the circulation, which temporarily increases the blood-pressure. The solution in any considerable quantity is not retained in the blood-vessels, but is eliminated at a rate proportional to the rate of administration through the same tissues that normally absorb water, mainly the alimentary tract. That the blood does not tolerate much dilution with normal saline, was

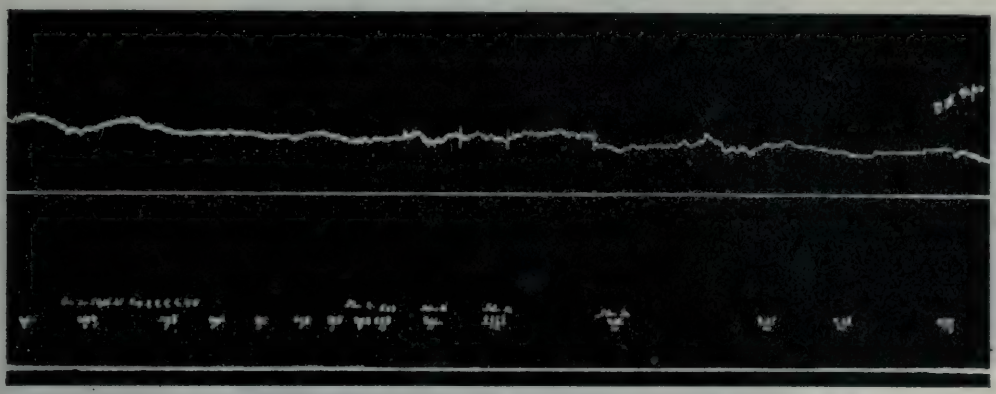

Fig. IV. The terminal tracing of a normal animal reduced to shock by strychnin.

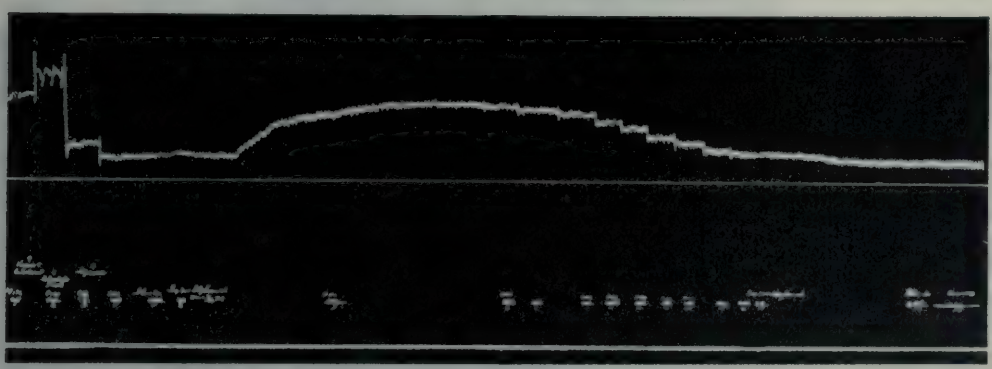

Fig. V. ETHER-Curare.—Both vagi and accelerantes severed. Animal reduced to such a degree of shock that stimulation of the sciatic nerve caused only a slight rise in the blood-pressure. On administering a physiologic dose of strychnin, the blood-pressure was raised to about the normal. The rise continued about twenty-five minutes, when it gradually fell. Then, on repeating the dose, no rise occurred, and on stimulating the sciatic nerve and burning the paw no rise occurred. The strychnin completed the exhaustion of the vaso-motor center.

shown also by repeated observations upon the number of corpuscles, and the amount of hemoglobin during its administration. The accumulation of saline solution in the walls, and in the lumen of the stomach and of the intestines, in the peritoneal cavity, and in the liver, after approximately 320 cc. per kilo has been given, causes so much abdominal distension as to progressively hinder and finally prevent the excursions of the diaphragm, and the moveable ribs, causing death from respiratory failure. In the cases of pure shock, i. e., in cases in which the vaso-motor center has been exhausted, and no blood has been lost, the rise in the blood-pressure, even during its administration, if prolonged, is not sustained, on account of the loss of the peripheral resistance and the elimination of the solution. Saline solution has a limited range of usefulness. It is obvious, then, that to increase and sustain the blood-pressure when the vaso-motor center is exhausted, it is necessary to create a peripheral resistance either by a drug acting upon the blood-vessels themselves, or by mechanical pressure. Adrenalin in the normal animal or in any degree of shock, caused a marked, and, in sufficient dosage, an enormous rise in the blood-pressure. This rise occured when the vaso-motor center was proven to have been exhausted; when it was cocainized; and when it was destroyed; it occurred when in addition both vagi and both accelerantes had been severed, and the animal was under the influence of curare. In larger doses, a marked inhibitory action upon the heart was noted. This was

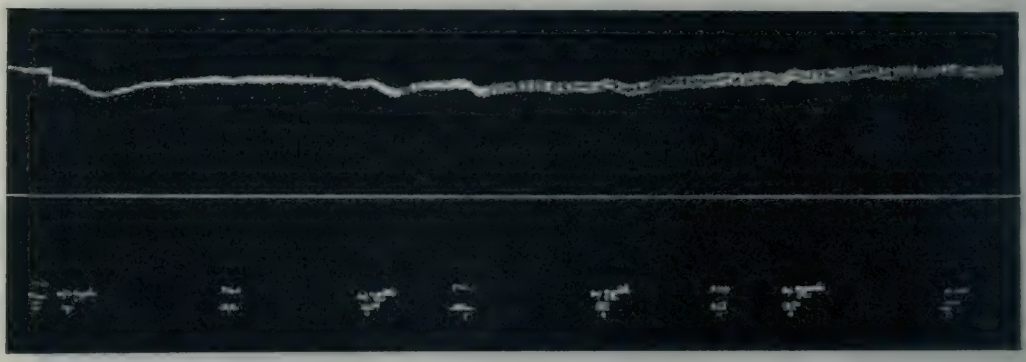

Fig. VI. NORMAL ANIMAL.—Note the gradual sustained rise in the blood-pressure, following the injection of digitalis.

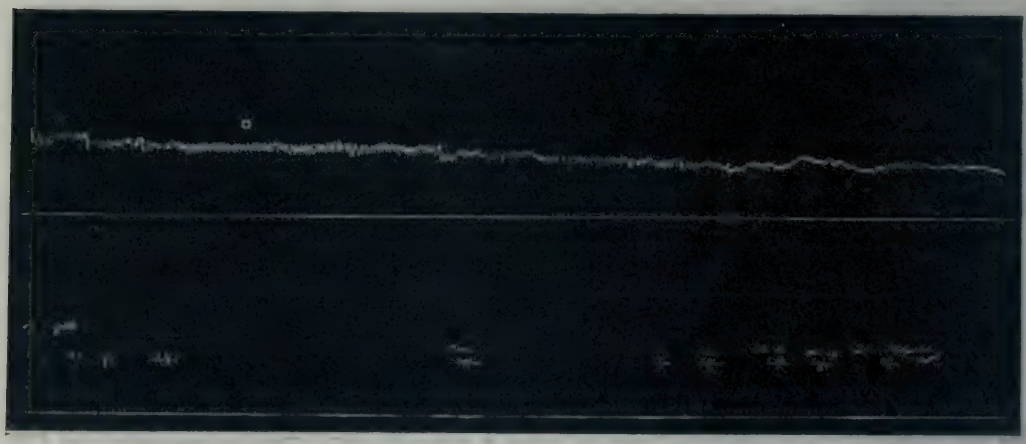

Fig. VII. PROFOUND SHOCK.—Note the negative effect of therapeutic doses of digitalis.

immediately relieved by the injection of atropin. It was finally found that the most effective method of administration was by a continuous intravenous infusion in salt solution, varying in strength from 1 to 50,000 or 100,000. After the experimental research seemed to have shown that adrenalin and salt solution thus administered could maintain the circulation with a heart isolated from the nervous system by section of both vagi and both accelerantes, with the vaso-motor center exhausted (complete shock), and with the muscular system paralyzed with curare, it followed that if these observations were correct, a decapitated animal must be kept alive during a certain period of time. An ordinary laboratory dog was decapitated. Adrenalin and saline solution were immediately and continuously administered. It was found that the blood-pressure could be controlled at will. The beheaded animal lived (?) 10 and ½ hours and finally died of air emboli, produced by the artificial respiration. On beheading animals, the

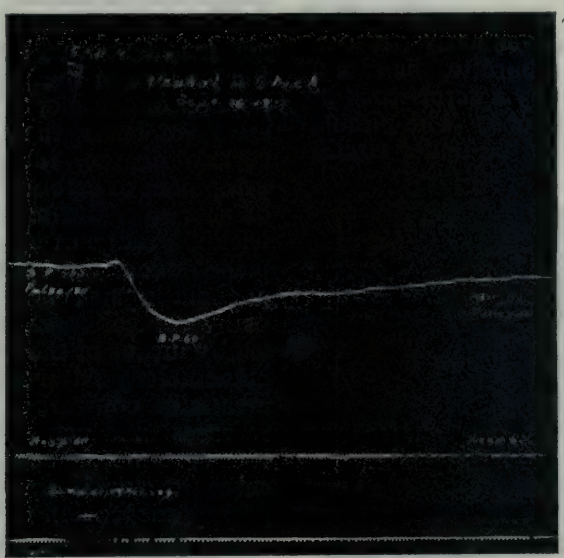

Fig. VIII. ANIMAL IN MODERATE SHOCK. —Note the fall in blood-pressure on injecting alcohol.

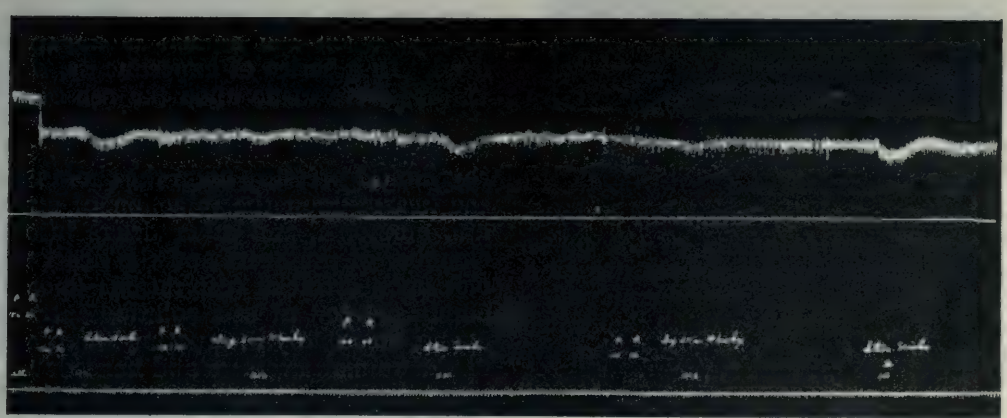

Fig. IX. Note the negative effect of the administration of alcohol in an animal in but light shock.

primary fall in the blood-pressure was approximately the same as in profound shock.

Owing to rapid oxidation in the tissues, adrenalin is found to be more effective when given intravenously, and since it is even more rapidly oxidized in the blood, it should be given continuously. It is found to be most conveniently given in saline solution from a burette, the rate of flow being controlled by a screw-cock attached to the rubber tube. The circulatory phenomena should be under contin-

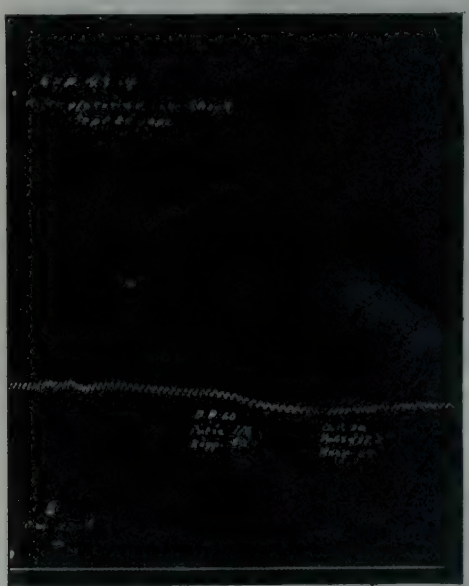

Fig. X. ANIMAL IN SHOCK.—Note the fall in blood-pressure on administering nitro-glycerine.

uous observation by means of a tonomanometer, and palpation of the pulse.

In considering external pressure as a means of supplying a peripheral resistance, it is well to bear in mind that when the vaso-motor center is becoming exhausted, the blood accumulates in the veins—especially in the large venous trunks. The condition may be described as an intravenous hemorrhage. Now, pressure applied uniformly upon the skin from the periphery toward the center over an area containing such intravenous hemorrhage, causes the blood to flow on toward the heart just as the normal vascular tone does. After numerous experiments with devices including water-baths and pneumatic chambers, in which it was attempted to devise a method of supplying an artificial peripheral resistance, a rubber suit was found to be the most practical. The suit is made of a double layer of specially constructed rubber, and when inflated, gives a uniform pressure upon the surface, producing an artificial peripheral resistance. The inflation is accomplished by means of a bicycle pump, and may be varied at will. Regardless of the posture of the patient, a considerable portion of the blood may be delivered to the right heart, thereby preventing, to a certain degree, the continuance or development of cerebral anemia. By means of this suit, the blood-pressure may be, within a range of 25 to 60 mm., mercury, placed under the operator's control. The pneumatic suit has been employed in many clinical cases, and the effects studied by means of the Riva-Rocci sphygmomanometer. After having considered the means of controlling the blood-pressure in cases in which there is exhaustion of the vaso-motor center (shock), and in cases in which there has been a temporary suspension of the heart, or of the vaso-motor center (collapse), it remains to consider the control of the blood-pressure in cases in which the vaso-motor center, the cardiac centers, the heart itself, and the respirations have all ceased to show any functional activity—that is to say, when the animal is apparently dead. In a series of experiments, observations were made upon the use of electricity; upon needling the heart; upon massaging the heart; upon making rhythmical pressure upon the thorax over the heart; upon the injection of strychnin, ammonia, and other drugs into the chamber of the heart and the heart muscle; upon artificial respiration; upon the administration of salt solution intravenously; on rapidly alternating the posture of the animal, head up and head down,—all of these methods were employed singly and in various combinations, but in no instance did we find it possible to resuscitate the animal after more than 58 seconds, after the last beat of the heart.

The most favorable results were obtained by combinations of rhythmic pressure upon the thorax over the heart; artificial respiration; and intravenous saline infusion. But unless the heart and the vaso-motor center resumed action, the blood-pressure could be raised and

sustained to but a very limited degree. During the experiments upon the decapitated dog, it was observed that adrenalin acted upon the blood-vessels after the circulation had ceased. It was then planned to kill the animals by asphyxia, give artificial respiration, make rhythmic pressure upon the thorax over the heart, and at the same time, administer adrenalin in saline solution into the jugular vein. By this means, adrenalin, through the feeble artificial circulation, could be brought into contact with the walls of the blood-vessels, causing their contraction, thereby increasing the blood-pressure, which in turn would re-establish the coronary circulation, which in turn would probably set up an action of the heart. By this method, animals apparently dead for various periods up to 15 minutes, were restored to conscious life again. Even dogs electrocuted by a shock of 2,300 volts of an alternating current, were resuscitated.

Summary.

Surgical shock is an exhaustion of the vaso-motor center. Neither the heart muscle, nor the cardio-inhibitory center, nor the cardio-accelerator center, nor the respiratory center, are other than secondarily involved. Collapse is due to a suspension of the function of the cardiac or of the vaso-motor mechanism. In *shock,* therapeutic doses of strychnin are inert, physiologic doses dangerous or fatal. If not fatal, increased exhaustion follows. There is no practical distinction to be made between external stimulation of this center, as in injuries and operation, and internal stimulation by vaso-motor stimulants, as by strychnin. Each in sufficient amount produces shock; and each, with equal logic, might be used to treat the shock produced by the other. Stimulants of the vaso-motor center are contra-indicated. Cardiac stimulants have but a slight range of possible usefulness, and may be injurious. In *collapse,* stimulants may be useful because the centers are not exhausted. Saline infusion in *shock* has a limited range of usefulness. In *collapse* it may be effective. The blood tolerates but a limited dilution with saline solution. Elimination takes place through the channels of absorption. Its accumulation in the splanchnic area, may be sufficient to fix the diaphragm and the moveable ribs, causing death by respiratory failure. Saline infusion, in shock, raises, but cannot sustain the blood-pressure. Adrenalin acts upon the heart and blood-vessels. It raises the blood-pressure in the normal animal; in every degree of shock; when the medulla is cocainized; and in the decapitated animal. It is rapidly oxidized by the solid tissue and by the blood. Its effects are fleeting; it should be given continuously. By this means the circulation of the decapitated dog was maintained 10 and ½ hours.

In excessive dosage there is a marked stimulation of the vagal mechanism.

The pneumatic rubber suit provides an artificial peripheral resistance without injurious side effects, and gives a control over the blood-pressure within a range of from 25 to 60 mm., mercury.

Physiologic rest; posture, heat, artificial peripheral resistance, guarded use of adrenalin and particularly when there has been considerable hemorrhage, normal saline solutions are the most reliable means of combating shock,—but prevention is the best cure.

By combined use of artificial respiration, rhythmic pressure upon the thorax, and adrenalin injected into the jugular vein, animals which were apparently dead as long as 15 minutes were resuscitated.

The control of the blood-pressure is almost equal to the control of life itself.

A Study of the Changes in the Blood-Pressure During Surgical Operations.

Operations On The Head.

Trephining. Incising the scalp caused no notable change in the blood-pressure. Separating the periosteum over a considerable area of bone by means of a periosteotome, caused a slight irregularity. Cutting through the bone by means of a mallet and a chisel, was followed by some irregularity, though no marked change. Irritation of the dura mater caused a fall with considerable irregularity.

In an operation for securing hemorrhage from a branch of the meningeal, a considerable manipulation was necessary. In order to control the hemorrhage during the removal of more skull, gauze was packed between the skull and dura some distance beyond the margin of the bone; this caused a very considerable fall in the blood-pressure. Exploring the brain by

means of a slender probe for a tumor, caused no appreciable change. A similar observation was made in exploring both lobes of the cerebellum in like manner, for a tumor. The incision of the dura mater with a sharp knife caused no appreciable change. Sponging, with pressure, caused the most marked fall.

In operations for the removal of the Gasserian ganglion, the blood-pressure and the pulse showed marked variations without any considerable net change until the skull was opened. In both cases in which these observations were made, the common carotid artery was closed, and the hemorrhage up to the point of making the intracranial dissection was practically nil. Elevating the dura caused an irregular fall in the pressure and an increase in the pulse. Separating, with considerable gentleness, the branches and the body of the ganglion, caused no marked change. Elevating the tempero-sphenoidal lobe in order to give room for the exposure and the removal of the ganglion, caused a marked rise in the blood-pressure, and an almost corresponding fall in the pulse-rate. During this part of the operation there was some oozing; against this, adrenalin tampons were used. A considerable rise in the blood-pressure in

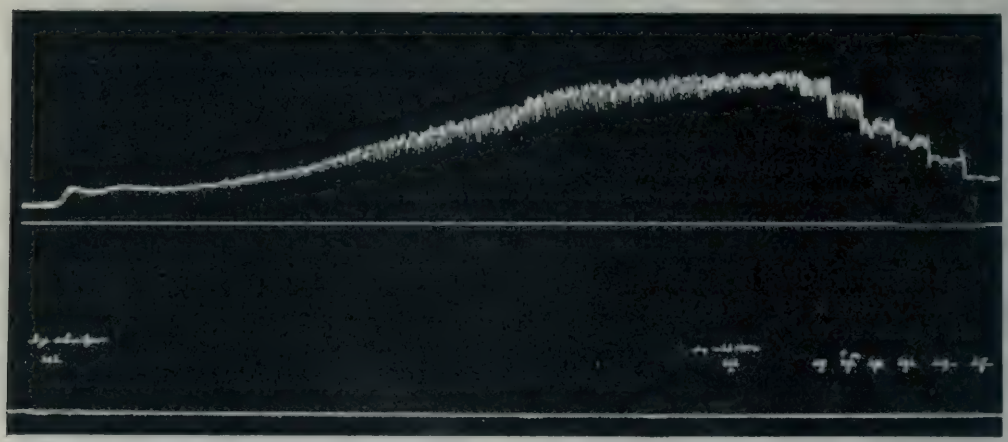

Fig. XI. ANIMAL IN PROFOUND SHOCK.—Continuous infusion of saline solution. Note the gradual rise in the blood-pressure, the increase in the pulse-wave, the absence of vaso-motor undulations, and, after a certain period, a decline in the blood-pressure equal to the rise.

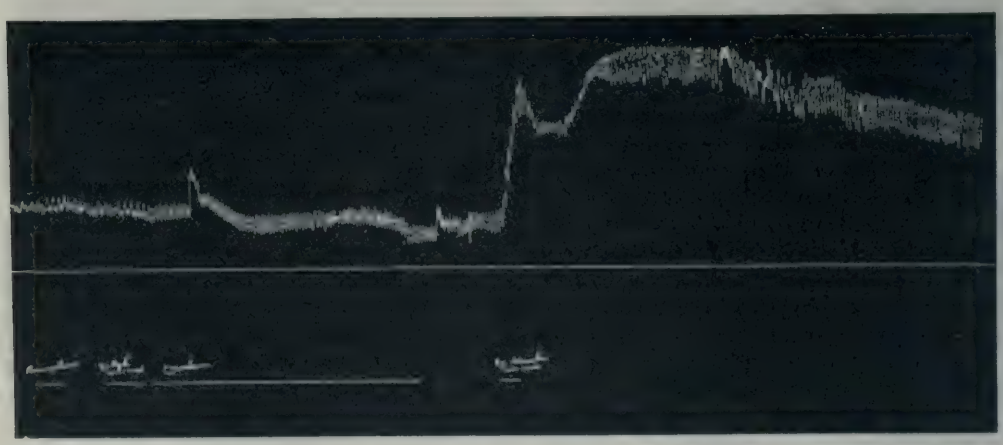

Fig. XII. SPINAL CORD AND MEDULLA COCAINIZED.—Strychnin caused no rise, excepting the slight one incident to the convulsions. Note the prompt and marked rise on injecting adrenalin.

one case followed, due probably to absorption of adrenalin. In both cases the posterior root was entirely exposed in a clear field, so that the effect of evulsion could not be noted. It was found in each case that when the root was entirely isolated, and in clear view, the weight of irritation of the dura mater and the pressure upon the brain caused a rapid fall.

The amount of shock in operation upon the head was proportionate to the manipulation, the pressure upon the brain, the hemorrhage, and the duration of the operation.

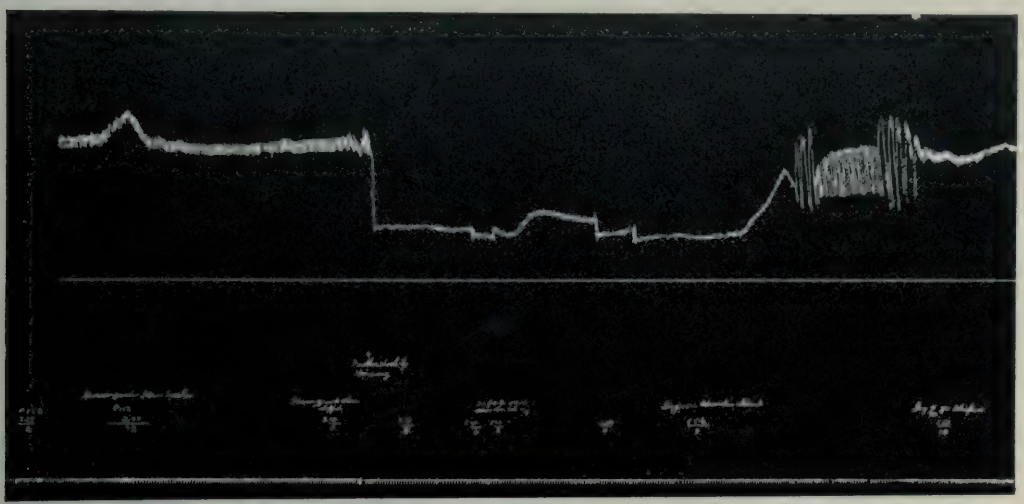

Fig. XIII. Note the decisive rise in the blood pressure on injecting adrenalin. Note the inhibition of the heart from over-stimulation by adrenalin. Note the prompt relief by giving atropin.

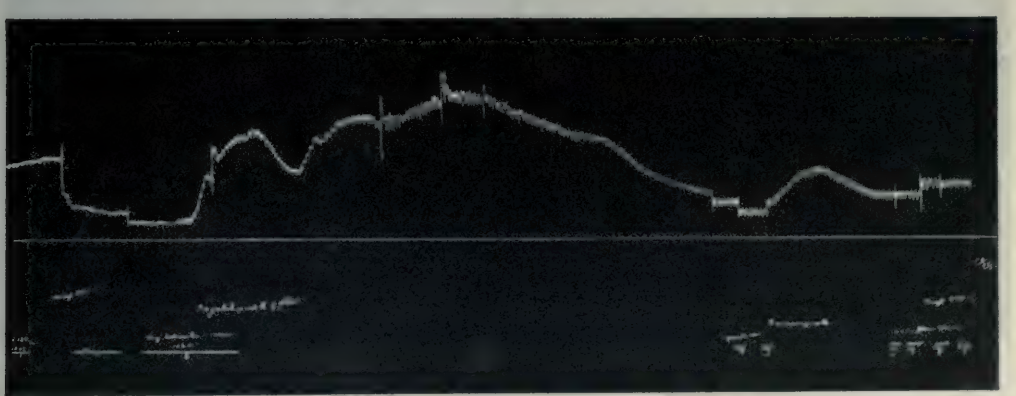

Fig. XIV. The first abrupt fall was incident to the decapitation of the dog. Note the absolute control over the blood-pressure obtained by continuous infusion of adrenalin. The irregularity in the curve was due to an adjustment of the rate of flow. This decapitated animal lived (?) 10½ hours.

the ganglion was sufficient to break it at the moment it was picked up to be severed with scissors.

The most rapid fall in the blood-pressure in the cerebral group occurred in a case in which there was rapid hemorrhage from the meningeal artery, which was controlled by gauze packing. The combined effect of the hemorrhage, the

Operations in the Mouth.

In bloodless excision of the tongue there was but little change in the blood-pressure or the pulse.

Operations on the Neck.

Tracheotomy. Asphyxia caused a very marked rise in the blood-pressure, and a slowing of the pulse-rate. In one case

the unusual opportunity presented itself of making observations upon the blood-pressure just before and during the development of asphyxia. The blood-pressure rose abruptly to 220 mm. Immediately upon opening the trachea and giving artificial respiration, the blood-pressure fell to 140 mm., and the pulse became more rapid than normal. The character of the pulse both as to quality and rate underwent as rapid changes as the blood-pressure.

Tracheotomy under cocain in the absence of asphyxia is attended by no special changes in the blood-pressure.

In all laryngeal operations during the time blood-pressure determinations have been made, the laryngeal mucosa and the superior laryngeal nerves were cocainized; under these conditions, opening the box of the larynx, explorations of the interior of the larynx, and even laryngectomy caused no marked change in the blood-pressure. In one instance while dissecting out glands lying close to it, the superior laryngeal nerve was subject to traction; this was attended by an immediate fall in the blood-pressure, and a marked slowing of the heart. Both were due to reflex inhibition from mechanical stimulation.

In one instance, a papilloma, which filled the entire box of the larynx, and extended up to and over the entire under surface of the epiglottis, was removed without any marked change in the blood-pressure.

In operations for the removal of tumors

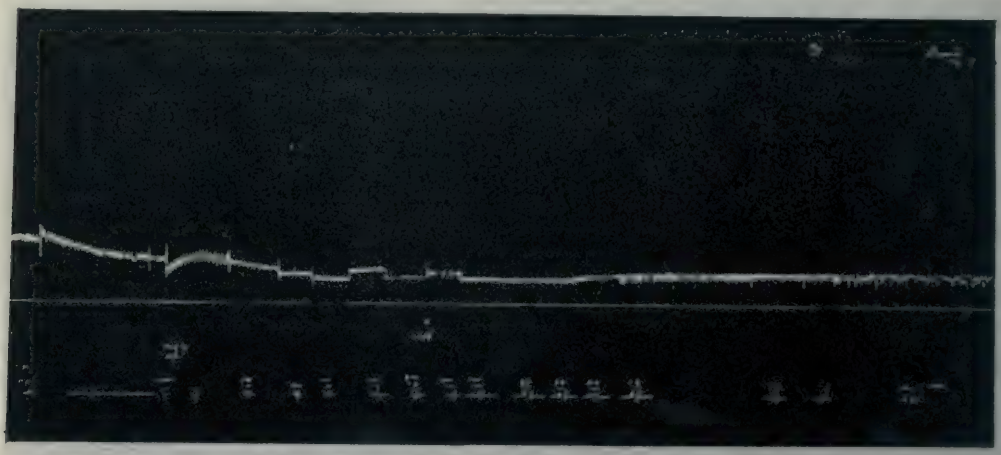

Fig. XV. Curve of blood-pressure four hours after decapitation.

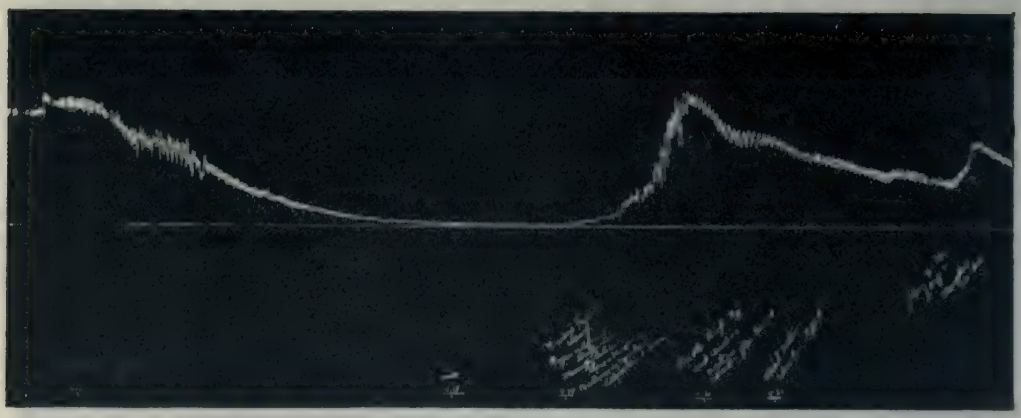

Fig. XVI. DEATH FROM ASPHYXIA.—The drum was stopped in the middle of the tracing. After a lapse of ten minutes, artificial respiration, rhythmic pressure upon the thorax over the heart, and intravenous infusion of adrenalin were simultaneously begun. The animal was resuscitated.

of the neck, shock was proportionate to the loss of blood, and to the mechanical insult to the tissues, to the manipulation of certain nerve trunks and to the duration.

In removing tumors of the parotid gland, it was found in two instances that division of the vagus caused no effect upon the blood-pressure, or the pulse; but rough manipulation and traction caused a considerable change. Observations were made upon eleven resections of the vagus. Dissections involving exposure and manipulation of the sympa-

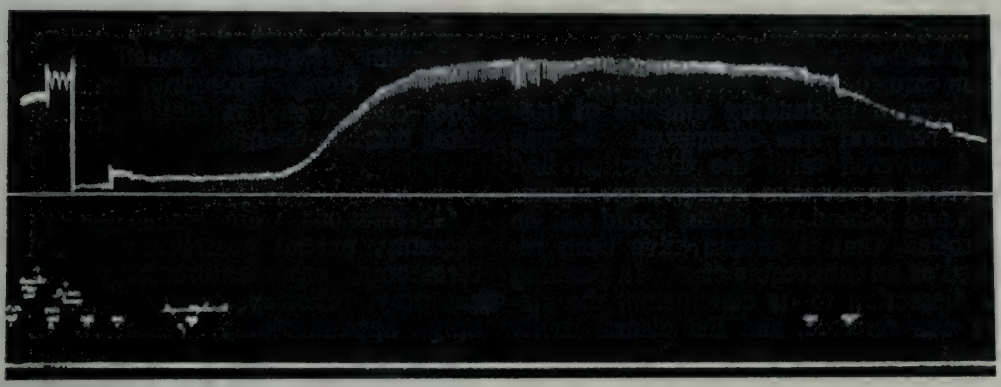

Fig. XVII. PROFOUND COLLAPSE.—Note the marked rise in pressure following the injection of a physiological dose of strychnin.

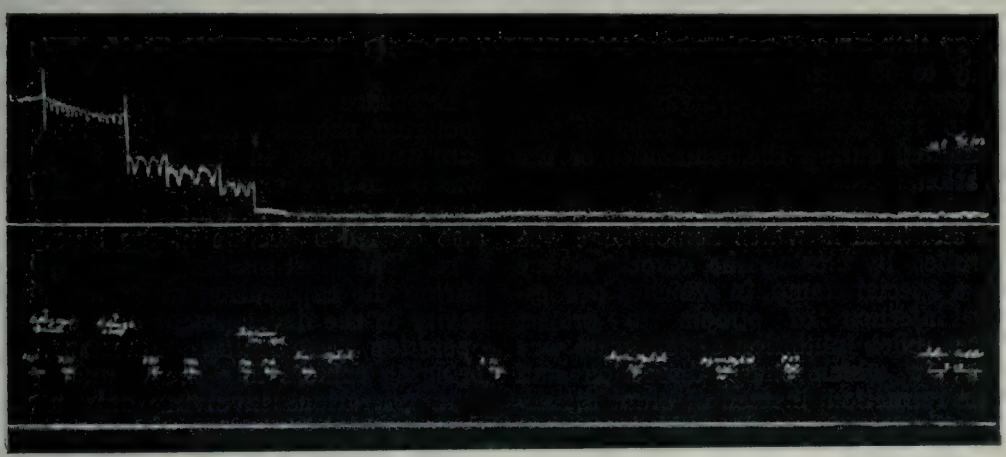

Fig. XVIII. CURARE: VAGI AND ACCELERANTES SEVERED—PROFOUND SHOCK.—Note the negative effect of repeated injections of strychnin.

while dissecting them out of their bed in the deep angle behind the jaw, a marked and sudden fall occurred in the blood-pressure, and in the pulse-rate. As soon as the change was noted the area was packed with cocain. After this by more careful manipulation, and from the effects of the cocain, the tumors were removed without producing further depression.

Excision of such muscles as the sterno-mastoid caused no marked change. Quick thetic nerve trunks caused an increase in the pulse-rate.

Resection of the trachea and of the esophagus caused no marked change. There were no immediate effects following temporary or permanent closure of the common carotid artery.

Observations upon the blood-pressure during the removal of five bronchial carcinomata, in which all the structures above mentioned were removed *en bloc,*

gave the opportunity for making these observations.

In the removal of bronchial cysts but little change in the blood-pressure was noted. In operations for the removal of tubercular glands the amount of shock was proportional to the vitality of the patient, the duration of the operation, the amount of blood lost, and the amount of mechanical irritation.

In a case of sarcoma projecting from the thorax into the lower portion of the neck, exhibiting a misleading amount of mobility, removal was attempted. It was not discovered until the dissection had proceeded so far that hemorrhage underneath and behind the tumor could not be controlled, that it should have been regarded as an inoperable case. In pushing this dissection to its conclusion, the clavicle was resected, and the pleural cavity opened. In this operation a rapid decline in the blood-pressure was noted. In the manipulation for dislodging the tumor from its deep bed, the brachial plexus was roughly manipulated, several trunks severed, and great hemorrhage incurred. During this time the blood-pressure fell rapidly to 68 mm.; the pneumatic rubber suit was then inflated, bringing the pressure to 110 mm., at which point it was maintained during the remainder of the operation.

In the removal of large tumors of the neck and head in which hemorrhage was controlled by closing the carotid artery with a special clamp, in which a preliminary injection of atropin to protect against reflex inhibition of the heart was given; in which sharp dissection and gentle retraction, instead of blunt dissection was largely made; and in which, when branches of the vagi were involved, inhibitory impulses were prevented by the use of cocain, comparatively little shock was encountered.

In all these serious operations the rubber suit was put on before beginning, and as occasion demanded the blood-pressure was supported so as to be maintained at a certain level.

Thorax.

Excision of the breast for carcinoma in middle-aged subjects was attended by only moderate changes. The blood-pressure sometimes showed a decline toward the close of the operation, and the pulse became proportionately accelerated. In an elderly patient a marked fall was noted.

In the complete dissection of the axilla, particularly when the large blood-vessels and the nerve trunks are involved in the dissection, the principle change in the blood-pressure was noted,—the net result of which was an irregular decline.

Dissection with a sharp knife, with minimum traction, caused the least change. Rough sponging, blunt dissection, and strong retraction caused the most marked change.

Abdomen.

Observations were made during pylorectomy, partial gastrectomy, gastroenterostomy, enteroenterostomy, choledochotomy, cholecystotomy, cholecystectomy, appendectomy, resection of the cecum and resection of the large and the small intestine. It was found that the amount of shock was directly proportionate to the amount of traumatism inflicted upon the peritoneum. Injury of the mucous membrane of the hollow viscera did not seem to be capable of producing shock.

Exposure to the air, manipulation, and sponging, caused a fall in the blood-pressure and a rise in the pulse-rate. This was noted in packing the abdominal cavity with gauze. Flushing out the cavity also caused a decline in the blood-pressure. The most marked effect was noted during the exploration of the abdominal cavity in the development of the field of operation, separating adhesions, and bringing tumors into the wound.

In operations involving only a small segment of the intestine, although considerable time was occupied, there was but little change in the pressure, after the first effect had worn off. This was true only when the remainder of the peritoneal cavity was kept free from irritation;—as for example, during the application of the sutures in an anastomosis there was but slight change in the pressure. The same is true in appendicectomy. During the technique for removal of the appendix but little change was noted.

In operations such as resection of gangrenous bowel, in strangulated hernia, the extensive washing and sponging of the field to remove infection was attended by a considerable decline in the blood-

pressure. The manipulation which caused the changes in the blood-pressure in almost every instance caused an increase in the respiration.

The most striking effects were noted in operations in the upper portion of the peritoneal cavity, near the diaphragm. The lower portion of the abdominal cavity showed less reaction. In all the abdominal operations above mentioned the net tendency of the changes in the blood-pressure was towards a decline. In some instances a temporary rise appeared, but this usually gave way to a greater decline.

On the female genital organs observations were made during operations for resection of the ovaries, removal of ovarian tumors, excision of the tubes for pyosalpinx, myomectomy, hysterectomy—both abdominal and the vaginal-dilating and curetting, and plastic operations upon the vagina and peritoneum. In almost every instance the immediate effect of manipulation of these organs in health and disease was a rise in the blood-pressure. This rise usually continued during the period of manipulation and was proportionate to the traumatism administered. The most marked rise was noted in the cases of large fibroid tumors, in which considerable difficulty, owing to impaction and adhesion, was experienced in raising the tumor from its bed.

Similar results were noted in operations upon the perineum and the vagina. Divulsion of the sphincter ani caused a very marked rise in the blood-pressure, and some increase in the pulse-rate. The respirations were markedly increased in depth and in rhythm. During manipulation of the sigmoid, respiration was always increased, particularly its inspiratory phase. This also occurred in dilating the cervix.

Genito-Urinary System.

Blood-pressure determinations were made during nephrectomy, nephrotomy, nephrorrhapy, and suturing of the ureter. During the removal of a large inflamed carcinoma of the kidney, the blood-pressure fell rapidly. In nephrorrhapy and incising the kidney but slight effects were noted.

Testicles.

In dissecting a firmly adherent sac of a scrotal hernia, marked fall in the blood-pressure was noted. In excising a thickened hydrocele sac the same was noted. In all manipulations when any effect was noted it was a fall. In amputation of the penis in an elderly subject the fall was marked. During careful dissection of the enlarged veins of a varicocele no effect was noted.

Spinal Column.

Blood-pressure determinations in two laminectomies under cocain anæsthesia were made. Incising the skin, fascia, muscles and the bones caused no appreciable change in the pressure. On exposing and exploring the membranes of the cord, a marked fall in the blood-pressure occurred.

In one case the exploration extended from the fifth cervical to the axis. It was found that the deep tissues of the back over the middle line have but few sensory nerve. No cocain was required in the division of the deepest fascia, the separation of the deepest muscles, the division of the spinous processes and the laminae, and in exploration of the dura mater with the exception of the points of exit of the sensory nerve roots. The slightest contact with a sensory nerve root caused an intolerable electric pain. There was quite a tendency to compensation following the fall in the blood-pressure on opening the canal and making mechanical contact with the dura.

Hernia.

In operations for inguinal hernia no effect was noted except in those in which there was adhesion of the sac to the spermatic cord, necessitating considerable manipulation. In such cases a fall in pressure was noted. This fall was probably due to the excitation of the characteristic depressor nerve mechanism of the part.

In operation for ventral hernia no special changes in blood-pressure were noted, except in the cases requiring considerable peritoneal manipulation.

Extremities.

Stretching the sciatic nerve caused a marked and irregular rise in the blood-pressure and an increase in the pulse-rate. Operating on the soft parts caused an irregularity in the pressure, more particularly a rise. Some of the cases of most profound shock were caused by heavy in-

jury of the limbs—as in railway accidents.

In an amputation of the shoulder joint, in which the trunks of the brachial plexus were cocainized, thereby "blocking" the afferent impulses due to operative injury, no material change in the blood-pressure was noted.

Operations Under Cocain.

In abdominal operations under cocain not so much alteration in the blood-pressure was noted as in operations under general anæsthesia. This was noted in an operation for typhoid perforation in a boy of twelve; in a case of cholecystectomy for gallstone in a woman of seventy; in two cholecystotomies in young adults during typhoid; in a gastrotomy with exploration of the esophagus; in colostomy; and in other laparotomies. If there was momentary pain or fear the blood-pressure usually rose irregularly.

The less amount of shock in these operations under cocain was probably due to several factors; there was no depressing effect of a general anæsthetic; the operations did not necessitate much manipulation; and the same precaution against causing pain—minimum manipulation—was just as effective against shock. In the instances in which either pain or fear caused a rise in the blood-pressure, a later decline was noted. Operations upon the area supplied by "nerve trunks," subjected to cocain "block" produce no shock. In all inter-varacico-scapular amputations in which the brachial plexus is "blocked" by cocain there was no shock.

275 Prospect Street, Cleveland, Ohio.

SOME POINTS IN THE DIAGNOSIS AND TREATMENT OF DISEASES OF THE NOSE AND THROAT, AND THEIR RELATION TO GENERAL MEDICINE.*

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The writer in choosing this broad subject expects to call attention only to a few conditions that have a bearing on general medicine, and to indicate, in a brief way, some points now commonly overlooked which may aid in interpreting these diseases.

The physiology of nasal breathing and its importance to the general health is not sufficiently appreciated. The old division of the nose, into an upper olfactory and a lower respiratory portion, has misled many. If we study the current of air, in its passage through a normal nose, in ordinary breathing, we find that it passes in an arched direction from its entrance at the vestibule of the nose, upward and backward by the side of the middle turbinal, and emerges into the naso-pharnyx at its upper portion. The current of air does not pass through the cavity opposite the inferior turbinal, as is often believed. This can be demonstrated by allowing a person to inhale some light non-irritating powder, and noting that the powder is carried to the upper portion of the nasal cavity, that the middle turbinal is covered with powder, while the inferior is comparatively free. The practical bearing of this fact is that, many times, a comparatively insignificant obstruction at the upper portion may interfere with free breathing, and give rise to distressing symptoms. The fact that by forced breathing air can be made to pass through the lower portion of the nose is no sign that it does so during quiet breathing. An enlarged middle turbinal pressing against the septum, at its upper portion, will leave considerable space beneath for forced breathing, yet these patients are mouth breathers, and often suffer considerable impairment of general health as a consequence. A woman consulted the writer complaining of pain over the root of the nose, radiating into the left eye; of shortness of breath on exertion; of palpitation of the heart

*Read before the Wayne County Medical Society, April 9, 1903.

and general malaise. All of the symptoms disappeared after removal of the middle turbinal of the left side.

The close proximity of the ethmoid cells to the middle turbinal, and the frequent involvement of the cells should make us remember that many obscure symptoms, referred to the head and eyes, may be of nasal origin. Orbital abscess is frequently due to suppurative disease of the sinuses. Hoople calls attention to intra-nasal pressure as an etiologic factor in affections of the ocular muscles. Conjunctivitis, affections of the lids, or lachrymal duct, may have as an important etiologic factor nasal disease, and, unless corrected, treatment directed to the ocular condition will be fruitless.

Adenoid vegetations in the vault of the pharynx are recognized more often than formerly, yet many do not seem to have a clear idea of the necessity of their removal when they interfere with free nasal breathing. A child nearly deaf was brought to me and an examination revealed the vault nearly filled with these growths, yet the family physician told the parents she would outgrow them. It is over a year since I made the examination, and I was recently informed by the teacher of the child that the hearing is almost completely lost. This seeming neglect on the part of the parents would be criminal were it not for the fact they were guided, or rather misguided, by their family physician. This brings up the question as to what can be done for deaf children toward restoring their hearing by the proper treatment of the naso-pharynx. The writer has given some attention to the causes of deaf-mutism in children, and finds that quite a large per centage can be, or could have been benefited by proper treatment directed to the nose and throat. Our city supports a department for the teaching of deaf mutes by the lip-reading method. Only a cursory examination of these pupils is necessary in order to show how prevalent catarrhal affections are among them. It is not necessary that the naso-pharynx be completely filled with the adenoid growths that they may interfere with nasal breathing, or cause deafness. The close relation between the middle ear and the naso-pharynx is now so well recognized, that the problem of the successful treatment of the ear resolves itself frequently into the ability to relieve the naso-pharyngeal lesions.

Asthma has for its exciting cause some lesion in the nose, in the large majority of cases. Some observers believe that all cases are due to nasal irritation. While this would seem an extreme view, the fact is that many cases can be permanently benefited, or entirely cured by proper treatment directed to the nose. The writer had recently under observation a young man, who had suffered from asthma the greater portion of his life. The symptoms all disappeared after the anterior ends of both middle turbinals were removed, and the inferior one on the right side cauterized. After the operations he was able to breathe through both nostrils freely, something he had not done before in years.

Turning our attention to the pharnyx we find interesting relations between the throat and general systemic conditions. The tonsils, which have always been a fruitful source for discussion, take on a new interest when we consider them as portals through which various infections take place. The close relation between rheumatism and tonsillar inflammation is now generally recognized, but that acute endorcarditis, pericarditis and pleurisy may follow an acute follicular tonsillitis is not generally appreciated, nor that an attack of an acute articular rheumatism may be ushered in by acute tonsillitis. One ought always to examine the heart in every case of acute tonsillitis. Quinsy sore throat is recognized as a rheumatic

affection. These facts help in the treatment of acute tonsillar affections . Large doses of the salicylates, with codeine will lessen the fever and pain in quinsy, and if used early will many times abort an attack and prevent suppuration in the peritonsillar tissue. As a treatment of acute tonsillitis it is very satisfactory.

In chronically enlarged tonsils we have a number of affections traceable to them. The crypts of the tonsils afford an excellent lodging-place for particles of food, which, together with the secretions into the crypts, supply the proper medium in which innumerable pathogenic organisms thrive. The decomposing material gives a foul odor to the breath, interferes with normal digestion and may cause gastric disturbance. Absorption of septic material from these crypts causes infection of the lymphatic glands of the neck, with enlargement and possibly suppuration. When enlargement of the glands of the neck exists one should seek for the point of infection. This may be found to be due to disease of the ear, nose, naso-pharynx, tonsil, teeth or larynx. The most frequent cause is disease of the tonsils. The tonsils may not be very much diseased and yet, if examined carefully with a bent probe, diseased crypts will often be found, forming blind pouches, through which infection may take place. A case of this kind may be cited in which a young man had an enlargement of a single lymphatic gland, which had existed for months. An examination of the tonsil on the corresponding side revealed only a slight hypertrophy, but with a probe a crypt was detected which formed a deep pocket and contained cheesy material. This crypt was destroyed with the galvano-cautery and the enlarged gland disappeared without other treatment. Tubercular infection of the lungs is now believed, in many cases, to find its point of entrance through diseased tonsils. In all cases of suspected lung disease one should examine carefully for diseased tonsillar crypts. The treatment of these tonsils depends upon the conditions present. Large tonsils ought always to be removed. Small tonsils where only one or two crypts are involved may be successfully treated by the galvano-cautery. A bent electrode should be passed to the bottom of the crypt and the pocket converted into a furrow in the same way as any fistulous tract. This allows healing to take place from the bottom, with obliteration of the crypt. An error is sometimes made in cauterizing the surface only. This often results in the closure of the opening with the formation of a retention cyst, or an abscess.

Considerable attention has been given, during recent years, to the study of the lingual tonsil. This tonsil is an aggregation of lymphoid follicles, similar in structure of the faucial tonsils, situated at the base of the tongue, in the space just anterior to the epiglottis. The lingual tonsil may be affected in a manner similar to the other tonsils. Disease of the lingual tonsil occurs usually in adults, children being rarely affected. In this respect it is the opposite of affections of the faucial tonsil. We may have acute inflammation, abscess, or chronic hypertrophy as in other tonsils. There are a few conditions often met with which have a practical bearing upon general medicine. Dilatation of the veins at the base of the tongue frequently causes very annoying symptoms. They can be readily recognized by examining the base of the tongue with a laryngoscopic mirror. The dilated veins will be seen radiating over the base of the tongue. This local condition gives rise to various symptoms; such as sensation of foreign body, the constant desire to clear the throat, dry hacking cough, tickling in the throat, rapid exhaustion of the voice after use, or constant hoarseness. Perhaps the most alarming symptom which may re-

sult from this lesion is the raising of blood, due to the rupture of small veins at the base of the tongue. The hemorrhage may be profuse. This symptom always suggests lung disease both to patient and physician. Several cases have been referred to the writer as cases of pulmonary hemorrhage, where examination showed the bleeding to come from a ruptured vein at the base of the tongue. These cases are quickly cured by proper treatment.

Hypertrophy of the lingual tonsils gives rise to similar symptoms in a more aggravated form. Besides the ordinary ones there is a group of peculiar nervous symptoms, somewhat hysterical in nature, that might be grouped under the term globus hystericus. Some of these patients suffer from a sense of suffocation and constriction around the throat. The symptoms are usually increased by excitement and fatigue. Tumors of this region are occasionally found. Perhaps the one most important to remember is the accessory thyroid gland which may develop at the base of the tongue. The occurrence of these tumors can readily be explained when we recall the communication which exists, in the embryo, between the thyroid gland and the base of the tongue, known as the thyro-glossal duct. When these tumors exist there is usually an atrophy of the thyroid gland in the neck, although this is not detectable in all cases. The writer has seen one of these lingual goitres during the past year with Dr. E. L. Shurly. The case was a young girl with a large tumor at the base of the tongue, interfering with breathing and deglutition. No atrophy of the thyroid gland could be detected. The tumor was skillfully removed by means of the cold snare, through the mouth. One of the interesting points in this case is that the girl, after about three weeks, developed myxœdema, which was controlled by thyroid extract. These tumors are harmless except as they endanger life by their size. Before removing them one ought to have in mind the possibility of the supervention of myxœdema.

If time permitted us to study other diseases of the throat in relation to systemic affections, we should find a number of conditions depending upon, or at least, influenced by the condition of the general system. Among those most prominent would be syphillis, rheumatism, lithemia and gastric disturbances. In some cases in which it is impossible to satisfactorily explain the condition of the patient by the local appearance of the throat, one will find by examining the heart, lungs or urine a clew that will aid in interpreting and successfully relieving the local distress. The opprobrium so often hurled at the medical profession that we can not cure catarrh, finds its justification, in the fact that so little attention is given towards making a careful examination, without which neither a working diagnosis can be made, nor successful treatment instituted.

Most of the diseases of the nose and throat can be cured if a proper understanding of the causes which underlie the affection is appreciated. The more serious malignant and tubercular diseases are usually incurable, but their course can be modified and the patient benefited by proper treatment. Atrophy of the mucous membrane of the respiratory tract is very rebellious to treatment; but even these cases can be markedly improved, and if the change in the mucous membrane is not too pronounced, all the disagreeable symptoms can be overcome.

912 Chamber of Commerce.

Dr. Koch, the tuberculosis expert, is in Rhodesia to investigate the cattle disease there. He believes that the disease is tuberculous in character.

ACUTE DILATATION OF THE STOMACH.*

By W. M. HARVEY, M. D.,
Detroit, Mich.

Acute dilatation of the stomach has, up to the present, scarcely received the attention it deserves. It is of the greatest interest to both physician and surgeons, since it may be met with by either at times when it is least expected.

In medicine, acute dilatation may be occasionally met with as a primary condition, but more often it occurs as a complication of some pre-existing disease.

In surgery, the condition may follow operations upon any part of the body, and may rapidly cause a fatal termination of cases which otherwise appear to be doing well.

Typical cases are characterized by their sudden onset, by vomiting an enormous amount of fluid, and by very severe general symptoms, which, too, often terminate fatally within a few days.

Clinically, acute dilatation of the stomach may occur to some degree without giving rise to any definite symptoms, and the condition will then only be made out by careful physical examination.

In the severe cases of acute dilatation, the stomach symptoms suddenly form the predominant clinical feature, and the original disease becomes, for the time being, of secondary importance. The onset is nearly always sudden.

The patient who is either apparently in usual health or suffering from some illness which appears to be taking its usual course, is suddenly seized with vomiting and discomfort, amounting in some cases to severe pain in the abdomen. This sudden onset is, as a rule, a striking feature of the disease. Pain in the abdomen and tenderness are both frequently met with, and may lead to the belief that the case is one of peritonitis, for which it has often been mistaken.

Vomiting appears to be nearly always present, and is generally the first symptom to which attention is drawn. The fluid expelled is variously described, as of a greenish, brownish color, and is usually thin and watery. In some cases it appears to contain bile, and in others matter from the small intestines, and under these circumstances it may become very offensive.

The vomiting at first is usually very frequent, but occasionally intermissions of various length occur, and lead to the idea—unfortunately too often an erroneous one—that the patient is getting better. The cessation of vomiting, when it occurs, is no doubt due to the muscular coat becoming paralyzed. Probably this so in most cases, especially toward the end; in others, where the intermissions are not of long duration, it may be that it is due to a temporary cessation of secretion of fluid into the stomach cavity.

Dilatations of the stomach are produced by two etiological factors: First—Mechanical stenosis of the pylorus. Second—Complete or relative weakness of the muscular walls, or forces.

The mechanical factors which lead to the stenosis, or occlusion of the pylorus, are situated either in the wall of the stomach itself or extend to it from without.

Among the most frequent causes of the former class, and of great importance, are carcinoma and cicatrical contraction, whether this be due to direct cicatrization of an ulcer or produced by inflammatory processes following ulcer or gastritis.

Cicatrization is usually due to ulcers situated near the pylorus, the healing of which causes not alone a stenosis but also frequently a thickening of the pylorus, which may even be palpated through the abdominal walls and which may be mistaken for a malignant growth. Congeni-

*Read before the Detroit College of Medicine.

tal stenosis of the pylorus may also be included among the mechanical constrictions.

The second cause for dilatation of the stomach arises from weakening of the muscular tissue, due either to excessive demands upon the muscle and its gradual relaxation, or to insufficient nourishment of the contractile elements of the gastric walls.

The weakening of the walls of the stomach is brought about not only by overloading the stomach with improper quantities of solid foods, with which the muscle is unable to cope, but also by the abnormal production of gases in the stomach.

As might be expected, the distended stomach gives rise to a swelling of the abdomen. The swelling is not uniform, but fills chiefly the left half and lower part of the abdomen; the right hypochondrium sometimes appears to be flattened. This swelling, which is of diagnostic value, is not, however, quite constant. No doubt the abdominal swelling varies with the vomiting, especially in cases in which there is a large quantity of fluid in the stomach. I have had cases in which the swelling would disappear after removing the fluid with a stomach-tube.

Peristaltic waves of contraction but very seldom occur, and their absence opposes the theory that the dilatation is due to pyloric obstruction. On palpation, a sense of fluctuation and a succussion splash may be obtained. Both these signs, and more especially the latter, often afford valuable aid in diagnosis; but it must be remembered that they will not always be present, since in some cases there may be but little fluid in the stomach, especially during the early period of the disease. When present, however, these signs are of undoubted value, and, in a great many cases, determine the diagnosis. Percussion will show the stomach resonence to be greatly increased, but the note will, of course, be greatly interferred with when there is much fluid. Percussion as a means of diagnosis is most important in those cases where there is no succussion splash or fluctuation, and a careful examination by this method will often reveal the early stages and less severe forms of the disease.

The symptoms of dilatation of the stomach, as a general thing, develop slowly. Dyspeptic troubles are the first to appear and they may last for years; in fact, may be the only symptoms of a well-marked case of dilatation. The general symptoms are those of collapse, the pulse is small and very rapid, the respirations are frequent and the temperature low—usually subnormal. The patient complains of great thirst, which is usually accounted for by the excessive vomiting of fluid. Vomiting is a characteristic sypmtom. At first this occurs quite frequently and very soon after eating, being to a certain extent a therapeutic effort of the organism to relieve itself of the excess of the ingesta, while a portion is retained in the stomach. Later, the vomiting occurs less frequently in proportion to the increasing relaxation of the walls of the stomach and as the quantity of collected matter to be evacuated becomes greater. Finally the vomiting ceases entirely. Then either the obstructing neoplasm has ulcerated, again opening the passage into the intestines, or the walls of the stomach have become paralyzed.

The clinical relations of the gastric juice in dilatation of the stomach depend upon the cause of the dilatation. Should a cancer be present, we would find a marked deviation from the normal standard. If, on the other hand, we have to deal with cicatrical contraction of the pylorus atonic conditions of the muscular fibers, or hypersecretion, we find almost without an exception, either the usual or increased quantities of hydrochloric acid,

peptone, and propeptone, and the peptic action is satisfactory, though usually somewhat slow. However, the secretion is complicated by the fermentation which takes place in the stomach and causes secondary decomposition of the stomach contents.

It is very apparent that the different disturbances of function react one upon the other. The development of the product of decomposition paralyzes the muscularis, and this paralysis favors the stagnation and with it the further decomposition of the ingesta.

These are but a few of the conditions from which a very appreciable dilation of the stomach may occur. Some people that have an abnormally large stomach, which causes them little or no trouble, may live for years. But some day this compensation fails and then suddenly, or in a short time, all the symptoms of dilatation of the stomach appear.

As the disease progresses, the nutrition is affected more and more. The hands and feet become a bluish red, cold and moist, while the face not infrequently becomes reddened by the development of acne pustules and marked congestion of the capillaries. While vomiting occurs less frequently, the foul smelling evacuations and flatulence are increased.

The pressure of the dilated stomach causes displacements of all the neighboring organs, especially the heart, lungs, liver and intestines, and interferes with their functions.

Dyspnœa and palpitation are increased according to the extent to which the diaphragm is forced upwards by the stomach filled with ingesta or distended by gases. The bowels are, as a rule, sluggish, and can be moved only by enemata or active cathartics, and the stools then are hard masses mixed with water and mucus.

Not only is absorption scanty or checked in the stomach, but it must also be diminished in the intestines, which are but insufficiently provided with chyme from the stomach at long intervals. This is especially true with the absorption of water, causing a dryness of the muscular and nervous tissues and of the skin.

Many suggestions have been made to account for the dilatations, but no single one of them can be said to give a completely satisfactory explanation of all the cases.

There are two distinct factors to be accounted for: (1) The cause of the paralytic condition of the stomach walls whereby they are unable to expel their contents; and (2) the mechanism which gives rise to the excessive secretion, which in many instances plays such an important part in the disease.

It has been thought that the excessive secretion is the primary factor and that the stomach dilates as a direct consequence of large quantities of fluid being poured into it. It is, of course, a difficult matter to establish precisely the relationship which exist between the distension and the secretion, but it is probable that they must be looked upon as two distinct processes.

The most likely explanation seems to be that the stomach wall becomes paralyzed and then later on the organ becomes distended with gas or excessive secretion. Moreover, the fact that excessive secretion is not present in every case makes it impossible to consider it as the primary cause.

Some further information regarding the relationship between the two processes may also be obtained from the consideration of cases of chronic dilitation which depend upon pyloric obstruction. In many of these there is a very great secretion, just as there is in acute cases.

Hemmeter, for instance, mentions a case of dilation of the stomach, due to malignant growth of the pylorus, in which on two occasions the stomach was

washed and emptied as thoroughly as possible, and the patient for forty-eight hours afterwards was fed by the rectum and all nourishment by the mouth stopped. At the expiration of this time, on the first occasion 545 cc. of fluid were drawn off, and on the second 500 cc. In such cases as this the increased secretion is obviously secondary to the dilatation, as it also frequently is in cases ofchronic dilatation which are not due to obstruction; and it seems, therefore, that the increased secretion is an accompaniment of the dilatation, rather than a cause of it, and that there may, perhaps, be some correlation between the two conditions being followed by excessive secretions. Very likely their relative importance varies, in acute cases, for there can be no doubt that excessive secretion, where present, adds greatly to the gravity of the situation, but there does not seem to be any clear proof that excessive secretion can act as the dilating force unless there is at the same time some paralysis of the stomach walls.

The view that there is some obstruction of the pylorus, whether permanent or spasmodic, must fall to the ground in face of the fact that dilatation of the whole part of the duodenum is so frequently present, and, moreover the vomit in severe cases clearly contains bile. It is, however, quite possible that the difficulty which the stomach meets with in getting rid of its contents is sometimes further intensified after distension has taken place, by some rotation at the pylorus which occurs as a result of distension.

Another objection to the theory of obstruction, whether at the pylorus or in the duodenum, is the fact that peristaltic waves of contraction have, with one exception, never been recorded, to my knowledge. The frequency with which the duodenum shares in the distention has given rise to the suggestion that an obstruction must in these cases exist a little below the stomach, and this idea is further strengthened by the very abrupt termination of the dilatation, which suddenly passes into collapsed intestines, thus producing a condition of things exactly similar to that arising from obstruction of the intestines from bands or other well known causes.

The constricting force, in many cases (according to some writers), has been thought to be the superior mesenteric artery, which has through some mechanical conditions within the abdomen, become pulled upon. The conditions necessary for the production of the dragging about by the displacement of the collapsed intestines into the pelvis, which is supposed to put such a tension upon the mesentery that the superior mesenteric artery becomes converted into a constricting force, which obliterates the lumen of the duodenum.

In the first place, it apparently requires a very considerable amount of force to produce obstruction in this way, though this varies with the direction in which traction is made, the least force being apparently needed when traction is made in the exact axis of the artery. With the patient lying on the back, the weight of the intestines will, for the most part, be supported by the posterior wall of the abdomen, and it is only when they are completely collapsed, and have all slipped into the pelvis, that there would be any likelihood of a sufficient force being exerted upon the mesentery; and even then, unless they hung as a dead weight over the edge of the pelvis, it would be unlikely that sufficient stretching of the mesentery would take place to produce this effect.

Against the view that constriction occurs through the medium of the superior mesenteric artery is the fact that the position of the apparent obstruction, as shown by the dilatation terminating ab-

ruptly in collapse, is not a constant one. In some cases it is only the first part of the duodenum that is distended, while in others the distention has extended along the jejunum. Again, if the extreme dilatation of the stomach is to be put down as a direct result of intestinal obstruction produced by pressure of an external band, such as the superior mesenteric artery, it must surely be supposed that, to produce this intense and protracted vomiting, the obstruction must be a very complete ne, and on this supposition it would be expected that the bowels would be uniformly and completely constipated, as they are in other cases, such as strangulated hernia, for instance.

There is constantly a tendency to constipation, but it is by no means either a constant or complete symptom, and in severe cases there have been actions of the bowels, often excessive, all through the sickness. I have in mind one case in which the intestines contained fluid similar to that in the stomach. All these points are against the theory that there is any tight stricture such as might be supposed to exist from pressure of the firm, cord-like superior mesenteric artery upon the bowel.

If a stricture at the junction of the duodenum and jejunum can be produced by prolapsed viscera as easily as some seem to think, it is certainly rather curioue that, considering the frequency of prolapsed viscera, acute dilatation of the stomach is not of more frequent occurrence.

The view that a paralysis of the stomach walls is the primary event in acute dilatation has received considerable support, and it must be confessed that it is one which seems to give the most satisfactory explanation in most cases.

That a paralytic condition of the stomach is present I think few will deny; the only question to be solved is, whether or not the paralysis is a primary affection of the stomach or is secondary to an obstruction lower down.

It is probable that paralysis may be produced by local interference with the nerves of the stomach, while in other instances it apparently arises through some remote effects upon the central nervous system—the subject, be it noted, being nearly always in a very debilitated condition.

As soon as the walls of the stomach have become paralyzed the vicus will become distended either by gas or fluid. It may be a little difficult to account for the presence of gas, but, however it may arrive, the fact remains that stomachs are freuqently found distended with it. By its mode of occurrence, the suddenness and volume of its generation and its innocence of taste or odor, it is clearly marked off from the foul wind generated by the fermentation of food. It is certainly produced in some way by the agency of the nervous system.

There is, then, no special difficulty in understanding that if under any circumstances the walls of the stomach are paralyzed, an overdistention by air may easily take place. Once distention has taken place, many secondary conditions may arise. The pressure on the surrounding viscera is very great, and secondary obstruction of the bowels might, it would seem, be produced without much difficulty.

Without wishing to deny it or in the least minimize the importance of secondary obstruction caused by the distended stomach, there is no obvious reason, if a primary paralysis is assumed to take place in the stomach—as there seems good reason to suppose is the case—why we should suppose the paralysis necessarily to be precisely confined to the stomach. The nervous connections between the vagi and abdominal plexus are very complex and it is not impossible that the paralysis which involves the stom-

ach may also extend a variable distance along the intestines, and if this were so, the variations of the places at which the distended bowel terminates would be accounted for.

It is, of course, possible and indeed, likely, that different cases arise from different causes, and as methods of treatment, in order to be successful, must as far as possible depend on causation, it will be well for the present to bear in mind the different possible ways in which the condition may be likely to arise, rather than to fix one's attention upon any one particular cause, to the exclusion of all others.

Acute dilatation of the stomach may run a rapid course and often terminate fatally in a few days. In most cases the acute symptoms are present more or less from first to last; in a few there are remissions of some hours and sometimes for longer, which makes it appear likely that recovery is possible; but, unfortunately, this idea is too often delusive, and all the active symptoms recur with unabated violence. The cessation of vomiting alone must not be taken as an indication of improvement, for, as I have already stated, vomiting frequently ceases a few hours before death and is probably a sign of absolute paralysis of the stomach walls and exhaustion of the patient. In such cases the cessation of vomiting is often quickly followed by increased abdominal distention, a sure sign that relief of vomiting is only a false indication of improvement.

The prognosis is extremely bad in a great many cases, and the disease in its typical form must be looked on as one of the most formidable met with in medicine and surgery.

It is almost certain, however, that the prognosis is not as bad as it looks, for up to the present, of course, with few exceptions, only the most severe cases have received any attention. One may, I think, feel quite sure that types of more moderate severity occur which end in complete recovery; and no doubt when the disease comes to be more carefully looked after all variations of severity will be met with and the percentage of recovery will be much greater.

A study of the recorded cases of acute dilatation seems to show that treatment has hitherto met with but little success; but this should not discourage further efforts, more especially at it seems probable that many cases of severity have recovered, and in some instances almost certainly as the result of timely treatment.

In cases in which there is vomiting due to excessive secretion, the most obvious indication is to empty the stomach by means of a tube, and this should be done as soon as possible after the diagnosis is made.

The vomiting in these cases is the natural attempt of the stomach to rid itself of its burden, but without artificial aid it is often unable to accomplish its task successfully, and in the later stages of the disease, when exhaustion sets in, the stomach ceases to empty itself and the distention often becomes extreme. It is, therefore, most important to aid the stomach in its efforts in this direction by passinga soft tube and drawing off its contents; great relief in this way may be obtained, and in a great many cases recovery is greatly assisted if it is not due entirely to this method of treatment.

The possibility of the dilatation being due to, or perhaps increased by, one of the forms of obstruction should be borne in mind and, with a view of relieving it, changes in the position of the patient should be tried. The prone position should be first tried and, if this does not give relief and the patient is not too ill, the knee-elbow position may be adopted.

All nutrition should be given by the rectum and the tendency to collapse met by hypodermic injections of strychnia;

it is in most cases useless giving medicine by the mouth, as there can be no reasonable prospect of it being absorbed.

Some of the more serious general symptoms are probably produced by loss of the large uqantities of fluid which are secreted, and this loss should be counteracted by injections of saline solutions into the rectum, or by transfusion.

The diet in dilatation of the stomach should be as limited as possible. We must restrict the use of fluids as much as we can. Give the patient as much nourishment as is possible to give in the smallest quantity possible, avoid thin soups, large quantities of alcoholic beverages, mineral and other waters, also tea and coffee in any amount.

As the treatment will extend for months and even years, we must content ourselves with a dry diet; all easily fermenting food stuff should be avoided. In severe cases nourishment may be given in the form of enemata or suppositories of peptone, the use of which can be continued for months if necessary. HCl in large doses you will find of great value in all forms of dilatation of the stomach which are not dependent upon atony of the muscles.

In atonic conditions, strychnine sulp. or ext. nux vomica are used with good results, it has been proved that they increase the production of HCl acid.

The cathartics have been proved to play an important part in therapy of gastric dilatation and they no doubt stimulate the gastric peristalsis, not only in evacuating the intestines but the stomach as well.

Next to washing out the stomach, I consider we get more good from a course of massage and Faradization than any other source. Massage, if intelligently applied, forces the contents of the stomach into the intestines and in this way dilates the pylorus by means of mechanical pressure. Cold applications have a tonic effect upon the muscle fibres of the stomach.

In a few cases of well marked dilatation I have obtained good results from having the patients wear an abdominal bandage. In this way the relaxed abdominal muscles are supported and thus the movements of the stomach and intestines are facilitated.

In all cases in which laparotomy is resorted to, it should be performed with an eye to the form of obstruction, and special attention should be paid to relieving any kind of pressure effects; for although these may not necessarily be the primary causes they are, no doubt, in many cases secondary conditions of great importance, often resulting directly from a distended stomach.

Whatever be the cause of the distention and paralysis, whether it depends primarily on nervous or mechanical causes, as the dilation in most cases extends only to the end of or a little below the duodenum, a communication between the stomach and jejunum will, when all else has failed, provide a continuous drainage from the stomach into the bowel below the seat of dilatation, and presumably, therefore, below the paralysis.

270 Woodward Avenue.

For the first time in history, the surgeon-general has been obliged to advertise for applicants to the medical corps of the navy. Circulars have been sent out to a number of the leading medical institutions. By the end of the year there will be more than fifty vacancies in the corps.

The legislature of New Mexico has exempted from taxation for the period of eight years each sanitarium building in the territory built in that time. This enactment is the result of plans on the part of promoters to interest capital in the establishment of a sanitorium to cost several hundred thousand dollars.

DETROIT MEDICAL JOURNAL

A MONTHLY EPITOME OF PRACTICE AND THERAPEUTICS

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THE SAJOUS DISCOVERY.

In the *Philadelphia Medical Journal* of March 7, 1903, appears a rather revolutionary article by Dr. Sajous, on the "Ductless Glands." The facts therein stated are new and startling and, if proved true, very valuable, giving to the medical world knowledge of the nature of the vital processes, without which, as he says: "Medicine can never hope to be ranked as a branch of applied science."

Practically all that has been known to date is that the oxygen inhaled is returned as carbonic acid gas; the intermediate processes we do not know. Dr. Sajous tells us this, tells us "how the cellular elements, out of which all tissues are built, utilize oxygen."

It is now, as is well known, taught in all the leading physiologies that the oxygen is taken from the alveolar air and loosely combined chemically with the hemoglobin of the red blood cell, changing it from a meth- to an oxy-hemoglobin, from a purple to a scarlet hue. We have been taught that the plasma was the carrier, by diffusion as well as by loose chemical combination of the carbon dioxid returned to the lungs from the tissue; certain radical experiments seemed to prove this. In this paper Dr. Sajous informs us that: "When the venous blood reaches the alveoli, the marked affinity of the adrenal secretion in the plasma for the oxygen causes it to absorb this gas from the alveolar air," (forming what he names *adrenoxin*) thus forcibly driving the carbon dioxid from the blood plasma.

The red cells, now bathed in this oxygen-laden medium, absorb of this oxygen, and act simply as "storage cells."

To the anterior pituitary body he gives the office of governing (through the nervous system), the functional activity of the adrenals and the thyroid bodies, producing as they do a stimulating, iodine-laden secretion, the function of raising to their highest efficiency the vital activity of all tissues. Thus he connects functionally these three bodies, the anterior pituitary, the adrenals, and the thyroids, forming what he has named the "adrenal system," having for its purpose: "To sustain physiological oxidation, and the metabolic activity of all tissues."

"It has thus become apparent," he says, "that while exophthalmic goitre is the result of adrenal over-activity, myxedema and its infantile form, cretinism, are due to adrenal insufficiency."

But here as in all intoxications, the physiologic action of drugs or of bacterial toxins, * * have proved to be results of excessive or reduced functional activity, *not* of the thyroid, adrenals, or anterior pituitary body as *individual* organs but as *related* organs."

Dr. Sajous regards the posterior pituitary body as the "general center of the nervous system," a co-worker with its mate, the anterior, which secures oxygenation of the blood through the adrenal system, while the posterior body adjusts the functional activity of all organs through the nervous system.

All toxics, we now find, either stimulate or depress the anterior pituitary body, and through it the adrenal system. Whether this toxic be called a toxin, a poison or a remedy, the phenomena of adrenal hyper- or hypo-activity always appear. He shows

that a toxic dose of quinin, or arsenic, the symptoms of cholera, etc., are similar to those following a double adrenalectomy, while in tuberculosis, pneumonia and many another diseases, he organ primarily at fault is the anterior pituitary body. "In fact," he says, "vulnerability to any disease, whether inherited or acquired, means insufficiency of this organ, that is to say, the adrenal system, because as a result of the impairment of this organ, we have reduced oxidation, entailing impaired metabolism and nutrition of all structures, including the heart." This would seem to greatly simplify the practice of medicine and therapeutics, for in all wasting diseases, all hypo- conditions, proper adrenal stimulation seems indicated. Indicated, however, in connection with the administration of alkaline salts, for he claims, and he lays great stress upon this, "that steadily as the febrile process advances, the alkaline salts are consumed and being inadequately renewed," (due to anorexia, etc.,) "the vital and defensive functions are increasingly hampered until life ceases." This applies not only to different fevers, but to uremic poisoning, puerperal eclampsia, etc., during which "as is well known, patients deemed to be *in extremis,* have been practically resuscitated by the use of an alkaline solution."

For the first time, we believe, the writer has given to the world the exact functions of the various forms of leukocytes. He finds that they all, cell-substance and nucleus, contain an intricate canalicular system through which the adrenoxin penetrates to the phosphorus contained in large quantity in the nucleus. The neutrophilic leukocytes, the phagocytes, constituting three-fourths of the white cells, "ingest proteids, certain hydrocarbons, sugar and starch in the digestive canal and convert them into peptone, myosinogen, and fibrinogen granules." Here is food for the medical profession as well as for these neutrophiles.

The eosinophilic leukocytes elaborate hemoglobin from the proteids, bilimbin, and iron, ingested by their parent cells, the neutrophiles; they take part in the formation of the epithelium of the pulmonary alveoli, and supply the underlying plasma with hemoglobin. This also we had not known.

The basophilic leukocytes form myelin, the active principle of which, lecithin, combines with adrenoxin to develop nervous energy.

Trypsin according to him, is almost entirely formed in the splenic vein, and taken directly to the liver, to act as an antitoxic and germicidal secretion, instead of being manufactured in and by the pancreas, as has been supposed, to be poured, not into the portal circulation directly, but into the intestinal canal, there to convert the proteids into peptones.

Furthermore we find that fatty degeneration wherever found, is mainly due to the accumulation in any tissue of partly oxidized fibrinogen, produced by a faulty adrenal system.

Dr. Sajous states that nervous energy is generated and set free by the combination of the lecithin of the myelin sheath with the adrenoxin of the plasma contained in the axis-cylinder.

If the article contained only one or two entirely new facts it would be easier to grasp, but here is a collection of a dozen or more fundamentally new ideas, answering at once many of the vexed questions of physiology and pathology. If all or many of these statements stand the test of experiments and time, it will necessitate the re-writing of our physiologies, pathologies and books on practice and therapeutics; will greatly simplify them all, placing them on a more scientific basis, remove the term vital phenomena, and show as he says: "Where the taper burns that we call life."

Seldom, if ever, has so much that is both new and true been given to the world at once. We have generally been compelled

to be satisfied with one new important discovery at a time.

If all that Dr. Sajous says be true, it seems to us, that not since the days of the discovery of the circulation of the blood has so much of value been given to the medical world, adding greatly to the lustre of the already celebrated name of Dr. Charles E. de M. Sajous.

OUR NEW HOME.

We have now permanently located the offices of the DETROIT MEDICAL JOURNAL on the first floor of the new four-story building recently erected by the J. F. Hartz Co. at Nos. 103 and 105 Miami Avenue. Here we shall have all modern facilities for editing and publishing the Journal in the best manner possible. We extend to our friends in the profession a most cordial invitation to pay us a visit when they are in the city, and to make headquarters with us. We are as much at your service in our office as we are in the Journal itself.

With new quarters, adequate for our needs, new and improved methods of handling the mailing-list and the mechanical work of publication, we shall endeavor to increase the value of the Journal as steadily as we have tried to do in the past. We take this opportunity to extend to our contributors and other supporters our hearty thanks for their co-operation, and to express the hope that they will continue to be with us.

The 39th annual report of Harper Hospital (Detroit) shows that 2,443 patients were admitted to the institution in 1902, an increase of 319 over the year 1901. In the main building, 2,320 patients were treated, in the diphtheria building 115, in the scarlet fever building 122, and in the department for out-of-door patients 1,877—a grand total of 4,434 patients. Prescriptions to the number of 10,164 were furnished. A number of gifts were received, which will make the work of equipping the hospital in a thoroughly efficient manner much more easy.

EDITORIAL NOTES

Milwaukee wants the American Medical Association to meet in the Wisconsin city in 1904. The association held its annual meeting of 1893 in Milwaukee.

The medical boards of Indiana, Ohio, Kansas, Wisconsin, Iowa and Michigan, have finally effected an agreement by which physicians who have successfully passed an examination in one of the states may practice in any one of the six without further examination.

Dr. Pierre Paul Emile Roux, sub-director of the Pasteur Institute at Paris, has been awarded the Osiris prize of $20,000 for his work with diphtheria serum. The prize was awarded by the Institute of France, and the decision giving the award to Dr. Roux was unanimous.

Dr. Ira Remsen, president of Johns Hopkins University, was elected vice-president of the national academy of sciences at Washington, D. C., on April 23 last. This left a vacancy in the office foreign secretary, which was filled by electing Prof. Simon Newcomb, of Washington, D. C.

Leland Stanford, Jr. University, at Palo Alto, Cal., is suffering in much the same way that Cornell did recently. There is an epidemic of typhoid at the institution, and more than 100 cases are reported. Impure milk is said to be the cause of the trouble, which is certainly serious enough.

In connection with New York's work among her consumptive poor there is contemplated the building of a solarium on

Blackwell's Island, to be used an an adjunct to the tuberculosis ward of the Manhattan Hospital. The proposed building is to be one story high, 200x24 feet and with verandahs around all four sides.

The thirteenth annual meeting of the American Electro-Therapeutic Association, will be held at Atlantic City, N. J., on September 22, 23, and 24 next. Since its organization in 1890, the association has gone steadily forward, and has devoted its attention to a scholarly, scientific investigation of what may prove to be one of the greatest curative measures of all time.

Dr. George B. Russell, Dr. Morse Stewart and Dr. Hermann Kiefer, three of the oldest members of the medical profession in Wayne County, were pleasantly banqueted by the Wayne County Medical Society on May 14. The banquet was given at the society's rooms in the Stevens block and was an enjoyable affair. A number of the older physicians throughout the state were present.

John D. Rockefeller has added another worthy enterprise to his list of benevolences. It is not the Chicago university this time, but an Institute of Medical Research. Mr. Rockefeller has signed contracts for the purchase of a tract of land on East River, New York City, extending from Sixty-fourth to Sixty-seventh street and work on the new institute will be begun August 1. A trifle less than $700,000 was paid for the land alone, an dit is evident that Mr. Rockefeller intends to do what he proposes along broad and generous lines.

Gov. Pennypacker, of Pennsylvania, has signed a bill making it against the law for any one to sell cocaine, or any patent or proprietary medicine containing cocaine to an habitual user of cocaine, without a physician's prescription. The penalty is made a fine of $100.00 or six months' imprisonment. The question of the cocaine evil is one that is attracting considerable attention, and there appears to be abundant need for a law of some kind to provide a penalty for the indiscriminate sale of the drug. Whether or not the provisions of the new Pennsylvania law are proper for the case remains to be seen.

Dr. William T. Councilman, of the Harvard Medical School, has announced that he has discovered the cause of small-pox. It has been determined that the cause is a micro-organism, which serves to relate the disease to malaria and to segregate it from the diseases caused by bacteria. The announcement is the result of findings in an investigation pursued by Drs. Councilman, George Burgess Magrath, assistant in pathology, and Walter Ramsden Brinckerhoff, of the City Hospital staff of Boston. The Boston board of health co-operated with the investigators during the recent epidemic of small-pox in Boston. The official confirmation of this announcement by Dr. Councilman himself is awaited with some impatience.

Congress at its last session provided for an increase of 150 numbers in the Medical Corps of the navy of the United States, of which 25 are to be appointed every year for six years. The regular percentage of vacancies from retirements, resignations and other causes is about ten per annum, so that 35 vacancies a year may reasonably be figured on. Examinations to determine the fitness of candidates for admission are conducted at Mare Island, Cal., and at Washington, D. C., and the board of examiners is in continuous session. The examinations are competitive, and the only requirements for trial are that a candidate shall be between the ages of 21 and 30, and a citizen of the United States of good moral character.

PROGRESS OF MEDICAL SCIENCE

SURGERY AND GYNECOLOGY.

Gant (*New York Medical Journal*, April 18, 1903), advocates the treatment of diseases of the rectum in the office rather than in the hospital and under local rather than general anæsthesia. A 3 per cent. B. eucaine solution or externally the ethyl chloride spray may be used. In this way hæmorrhoids, external or internal, fissure, ulcer or fistula proctitis and, in fact, all minor diseases of the rectum and onus, may be painlessly and satisfactorily treated and cured, without interfering materially with the business or pleasure of the patient. He performs valvotomy by applying a valve clamp which cuts its way out by pressure necrosis in from four to six days, leaving the severed edges of the valve widely separated.

Ingersoll Olmsted (*Philadelphia Medical Journal*, March 21, 1903), reports 12 cases of goitre successfully operated under infiltration anæsthesia following Kocher's method, briefly as follows:

A bowed incision is made with its convexity downward, across the tumor from the outer surface of one sternomastoid muscle to the other, extending through all the tissues down to the muscles of the neck, and this flap is reflected upward together with the fascia covering the muscles. The muscles are now separated in the median line along the whole length of their course, as well as the outer fibrous capsule of the goitre. If the goitre be very large and sufficient room cannot be obtained by retracting the separated muscles, their upper attachments may be divided a little on either side of the median line with scissors. This will invariably give room enough, and, after the tumor is removed, they may be stitched back in place. The lateral lobe is now dislocated from its bed by passing the finger in between it and the fibrous capsule. Any veins running between the capsule and the goitre are divided between forceps and carefully ligated. This permits the lobe to be pulled out quite easily, as a rule. By shoving back the capsule from the upper and outer horn of the lobe, the superior thyroid artery may be isolated, doubly ligated and divided. The inferior thyroid artery is now carefully isolated from the recurrent laryngeal nerve and ligated. It is important at this point to get the patient to say "ah," so as to insure the safety of the nerve. The thyroidea ima veins are clamped and divided, the isthmus separated from the trachea with the sound, crushed with clamp and ligated with strong ligature. The clamp will crush a large voluminous isthmus to almost nothing, so that there is practically no danger of hemorrhage from this source. There only remain now a few attachments of the gland at the side of the trachea, and it is as well to leave some glandular tissue here as a protection to the recurrent laryngeal nerve, as otherwise there is a danger of the nerve becoming injured later. All bleeding points having been carefully caught and ligated, the muscles are brought together with interrupted sutures in the median line, and the skin wound closed with subcuticular suture.

Operation in Graves' disease has a marked effect, the hypertrophy of the thyroid seeming to act as a multiplicator of the symptoms and nearly all cases completely recover or show marked improvement.

MEDICINE AND THERAPEUTICS.

Futterer (*Northwestern Lancet,* April 15, 1903), discussing chronic round perforating ulcer of the stomach considers the location of the ulcer very important as regards prognosis. Thus an ulcer at one of the curvatures may open up a large blood-vessel or at the pylorus or cardia may cause stenosis or in any locality may perforate into the adjacent viscera.

Ulcer of the stomach occurs in about 5 per cent. of the population, two-thirds of the cases being women. Anæmia, chlorosis, or after the age of twenty-five a secondary anæmia, due to disturbances of digestion and assimilation are the usual causes.

The diagnosis is made from the pain which generally commences shortly after meals, vomiting and regurgitation, and the presence of blood in vomit or stools.

Careful study is often necessary to differentiate gastric ulcer from duodenal ulcer, gall-stones, gastralgia or carcinoma.

The ideal treatment is based upon anæmia as the underlying cause, and measures should be taken to bring the hemoglobin percentage up to normal. Rest in bed with liquid diet-milk and beef-juice ad libitum should be continued for 6 or 8 weeks. Medicinally a one per cent. solution of nitrate of silver is given on the empty stomach in tablespoon doses three times daily.

DIAZO REACTION.

Billings (*New York Medical Journal,* April 18, 1903), from investigations in the laboratory of the New York Department of Health concludes:—

1. The examination of the urine in cases of typhoid fever is of value, provided that its limitations are recognized.

2. While not so absolutely pathognomic of typhoid fever, yet the diazo reaction is even more constantly present in that disease than the Widal reaction, so tnat its absence at a period when it should be present, if the case is one of typhoid fever is of considerable value in making a negative diagnosis.

3. In a majority of instances the diazo reaction is present in the urine at least forty-eight hours earlier than the Widal reaction in the blood.

4. It disappears much earlier than the Widal reaction, however, and negative results obtained later than the second week are of little or no value.

5. "Doubtful reactions" have slight significance.

LABORATORY DIAGNOSIS.

Willson (*Journal American Medica. Assn.,* May 2, 1903), in a careful paper on leukocytosis, reaches the following conclusions:

1. The term leukocytosis must include every increase in the absolute number of the leukocytes of the blood examined, as well as every increase in the percentage, count of the various leukocytic forms.

2. A leukocytosis, of whatever nature, must always be regarded as a clinical sign of importance, but never of such weight as to influence against equally convincing physical signs.

3. A high percentage of the polynuclear forms in the absence of an absolute leukocytosis indicates the presence either of pus or of some grave inflammatory process, together with a low vitality of the patient.

4. Specific factors may rarely exert such an unusual influence as to interfere with the customary reaction of the polymorphonuclear cells. At least one instance has been noted in which the total number of leukocytes was increased at the same time with a marked reduction in the number of the polymorphonuclear forms. This condition is probably seldom encountered.

5. Single counts of the leukocytes, or single estimations of the leukocytic per-

centages are often misleading; while a persistent series of observations will seldom fail to aid in the diagnosis and treatment of the condition.

6. A gradual, but steady, rise in the total count of leukocytes above the customary number usually indicates the presence of an active and augmenting inflammatory influence. When this reaches large proportions it may be looked on as an indication of the presence of an active leukocytic process (seroses or inflammatory effusion, localized pus collection, pneumonic exudate, etc.), provided the clinical picture bears out the suggestion.

Three points deserve special notice. The broadening of the definition of leukocytosis to cover relative increase of the polymorphonuclears as well as absolute increase in the number of leukocytes and the significance of this "relative" leukocytosis are valuable suggestions.

The emphasis laid on the necessity of several counts and of considering the blood findings in the light of information gathered at the bed-side and not alone, is very much to the point.

LARYNGOLOGY, OTOLOGY AND RHINOLOGY

The Modern Concept of Cold and its Treatment.—

John Zahorsky (*New York Medical Journal*), shows what a misnomer the term "Cold" is, since the condition is not due to cold, but rather depends upon the activity of certain micro-organisms. "Colds" are more frequent in winter, because of the more intimate commingling of people in appartments and places of amusement in which the air becomes stagnant and the germs wafted in the atmosphere. He epitomizes as follows:

1. Colds run a more or less definite course. If colds were merely reflex congestions, these should terminate soon after the excitement ceased. As a matter of fact, colds last from three to seven days in spite of our therapy.

2. The inflammation begins at one point and spreads up and down the respiratory tract. This is a common observation, and very much resembles the dermatides of infectious origin; *e, g.,* erysipelas.

3. Colds are accompanied by fever and general symptoms. This is especially true among infants. These general symptoms are usually proportionate to the extent of the local inflammation.

4. Microscopically, as well as macroscopically, inflammatory changes are found in the mucous membrane.

5. The ordinary secretion of the mucous membrane is soon replaced by a discharge more or less purulent.

6. Specific micro-organisms have been isolated from these secretins. Among these, the *bacillus influenzæ, diplococcus lanceolatus,* Friedländer's bacillus, streptococcus, etc., have been demonstrated.

7. The varying clinical picture of colds speaks for a variety in the virulence and character of the bacteria.

8. Colds are contagious. It is hard to conceive how this clinical fact, so easily demonstrable, has received so little attention in the literature of the past. In schools, asylums and hospitals this fact is very clearly shown almost annually. In family practice too, the development of one case after another in spite of care is very common observation.

9. A relative immunity follows each attack. Were colds merely reflex congestions, these congestions should appear after each exposure. But after an attack the individual will be free from a cold for some time.

Treatment of Influenza.

The following is a brief résumé of the treatment of Epidemic Influenza, taken from the latest edition of Hare's textbook on therapeutics:

To abort the attack in first few hours:

℞ Tr. aconit. rad..... 2 (ℨss.)
Spts. ætheris nitrosi..12 (ℨiij)
Potassii citrat..... 4 (ʒiij)
M Aquæ q. s...ad.....30 (j)
Sig. One teaspoonful every four hours, during first day of the attack.

For the irritative cough in first stage:

℞ Tr. benzoini comp.... 4. (ʒj)
Sig. Add to one pint of boiling water, and inhale the steam.

For the cough in the height of the attack:

℞ Ext. cannabis ind.....
....015 to .6 (gr. ¼ to 1), or
Codeinæ sulph.....
....015 to .6 (gr. ¼ to 1).
Sig. Every three or four hours.

For the bronchitis in the early stage:

℞ Vini ipecac..... 8 (ℨij)
Potassii citratis ..... 8 (ℨij)
M Syr. pruni Virg.....60 (ʒij)
Sig. One teaspoonful every two hours.

Aural Bougies in Ear Ache and Otitis Externa.—

Dr. Geo. L. Richards, of Fall River, has aborted ear ache in more than half of the cases occurring in children by the use of an aural bougie inserted in the external auditory canal. Each bougie is composed of a modified formula of gruber, consisting of Fld. Ext. Opii. 1-7 m; Cocain, 1-4 gr.; Carbolic Acid, 1-16 m.; Atropine Sulph., 1-14 gr. Gelatine, glycerine and water to form a mass. The bougie is about 1-2 inch long and the size of a quill. Contrary to belief, considerable absorption takes place in the auditory canal.

Some Iowa physicians recently formed a trust to keep rigidly to a schedule of fees; the trust has been dissolved. This result could readily have been foretold. Physicians by the very nature of their labors are unable to set any hard and fast rules for fees—and then stand by them.

The Samuel D. Gross Prize.—This prize, of twelve hundred dollars, will be awarded on January 1, 1905. According to the conditions of the prize, it will be given every five years to the writer of "the best original essay, not exceeding one hundred and fifty printed pages, octavo, in length, illustrative of some subject in surgical pathology or surgical practice, founded upon original investigations, the candidates for the prize to be American citizens."

The successful competitor shall publish his essay in book form, and deposit one copy thereof in the Samuel D. Gross Library of the Philadelphia Academy of Surgery, and on the title page must appear the information that the essay was awarded the Samuel D. Gross prize of the Philadelphia Academy of Surgery. All competing essays, each of which must be written by a single author in the English language, should be sent to the "Trustees of the Samuel D. Gross Prize of the Philadelphia Academy of Surgery, College of Physicians, 219 S. 13th St., Philadelphia, on or before January 5, 1905. Each essay must be distinguished by a motto and accompanied by a sealed envelope, bearing the same motto, and containing the writer's name and address. Only the envelope accompanying the successful essay will be opened, and the committee will return all unsuccessful essays if reclaimed by their respective writers, or their agents, within a year. The committee reserves the right to make no award if no essay submitted is considered worthy of the prize. John B. Roberts, M. D.; William L. Rodman, M. D., and William J. Taylor, M. D., are the trustees for the awarding of the prize.

L. C. Stephenson is said to be the Minnesota representative who fathered the bill recently passed by both houses, regulating the practice of osteopathy.

BOOK REVIEWS

International Clinics. A Quarterly of Illustrated Clinical Lectures and Especially Prepared Articles on Medicine, Neurology, Surgery, Therapeutics, Obstetrics, Pædiatrics, Pathology Dermatology, Diseases of the Eye, Ear, Nose and Throat, and other Topics of Interest to Students and Practitioners by Leading Members of the Medical Profession throughout the World. Edited by Henry W. Cattell, A. M., M. D., Philadelphia, U. S. A., with the Collaboration of John B. Murphy, M. D., Chicago; Alexander D. Blackader, M. D., Montreal; H. C. Wood, M. D., Philadelphia; T. M. Rotch, M. D., Boston; E. Landolt, M. D., Paris; Thomas G. Morton, M. D., Philadelphia; James J. Walsh, M. D., New York; J. W. Ballantyne, M. D., Edinburgh, and John Harold, M. D., London, with Regular Correspondents in Montreal, London, Paris, Leipsic and Vienna. J. B. Lippincott Company, Philadelphia and London. Cloth, $2.00. Volume IV., Series XII.

Among all the books that come to our table, we pick up numbers of this popular series with interest; there is always something that is interesting and important to be found between the covers. The present work completes the twelfth series, in which over 1,200 pages of text, written by authors of universal reputation, have appeared, with 218 illustrations and twelve colored plates. There have been ninety-eight articles on topics of lively interest and the man who has these volumes on the shelves of his medical library may take them down with profit at all times. The plan of the work is admirable, and it is well carried out by the editors, while the publishers place it within the reach of men of moderate means.

The present volume contains articles by twenty-four contributors, embracing therapeutics, medicine, neurology, surgery, dermatology and ophthamology, and a particularly valuable monograph on the blood in health and disease, by Thomas R. Brown, M. D. Biographical sketches of Horatio C. Wood, M. D., LL. D., and of William W. Keen, M. D., LL. D., are contributed by Guy Hinsdale, A. M., M. D.

A Pocket Text-Book of Anatomy. By Wm. H. Rockwell, Jr., M. D., Assistant Demonstrator of Anatomy, College of Physicians, Columbia University, New York. In one 12mo Volume of 600 Pages, with 70 Illustrations. Lea's Series of Pocket Text-Books. Edited by Bern B. Gallaudet, M. D. Cloth, $2.25 net; Limp Leather, $2.75 net. Lea Bros. & Co., Philadelphia and New York.

A knowledge of what the student needs, and of what is necessary for refreshing the memory of the practitioner who wants to "read up" a little on his anatomy, combined with some good ideas on how to convey this knowledge in proper form to the reader, serves to make this book of Rockwell's one worthy of attention and use at the hands of the profession. The information is condensed and concentrated into such a form that the most possible is said in the fewest possible words. The work is intended as a reference hand-book, and for this purpose it is admirably well suited.

The text takes up in order the subjects of Osteology, Arthrology, Myology, Angeiology, Neurology and Splanchnology, with a brief but comprehensive description of each portion of anatomy coming under these heads. The definitions and descriptions are terse and understandable, and where illustrations would

serve to impress a point, they have been inserted. We can sincerely congratulate the author, the editor and the publisher on the result of their work.

A Syllabus of New Remedies and Therapeutic Measures, with Chemistry, Physical Appearance and Therapeutic Application. By J. W. Wainwright, M. D. Cloth, $1.00. G. P. Engelhard & Co., Chicago.

This little book of 224 pages gives in a compact and convenient form the names, trade and technical, the chemical composition and the use of the numerous new therapeutic agents that have come into more or less prominence within the last few years. The work is the result of a desire on the part of the author to furnish the physician with some practical knowledge of the new remedies resulting from synthetic chemistry, clinical reports on which have appeared in the medical journals from time to time. As far as convenience is concerned, he has certainly accomplished much good. He has taken only the recognized synthetics, those of which the chemistry is known and of which the exact formula can be published. Dr. Wainwright has condensed a great deal of useful information into a small compass in this little book, and has furnished the busy man with an opportunity to keep in touch with many new things.

A Text-Book of Practical Medicine. For the Use of Students and Practitioners. By William Gilman Thompson, M. D., Professor of Medicine in Cornell University Medical College, Physician to the Presbyterian Hospital, Bellevue Hospital, etc., New York. New (2nd) edition, thoroughly revised. In one octavo volume of 1,104 pages, with 62 illustrations. Cloth, $5.00; Leather, $6.00; Half Morocco, $6.50 net. Lea Brothers & Co., Philadelphia and New York.

The present edition of this work differs only slightly from the successful first edition. About fifteen pages of new material have been added, and the numerous minor changes have been made in the main body of the text, bringing it all down to date. Dysentery, yellow fever and malaria are carefully treated in rewritten articles and the same course has been followed with the articles on the diseases of the blood and heart. Dr. Thompson has had a wide experience of over twenty years of practice, teaching and hospital work, and he has given his readers the benefit of all this and more. In its present form the book presents a mass of carefully gathered material, well arranged for convenience and authoritative in character.

Tables are frequently used as a matter of convenience, and there are a number of really good illustrations. The text-book has been a popular one in its first edition; and we believe that it will even more so in this improved form. The volume is handsomely bound and published.

Diseases of Metabolism and Nutrition. Authorized American Edition, Edited by Boardman Reed, M. D., of Philadelphia. Part III. Colitis. By Prof. Dr. Carl von Noorden, Physician-in-Chief to the City Hospital, Frankfort-on-Main. Pages, 64. Price, Cloth, 50 Cents. E. B. Treat & Co., Publishers, New York.

This is the third little book in the interesting series compiled from the writings and lectures of Prof. von Noorden. It deals in a masterly manner with the general subject of membranous catarrh of the intestines (colica mucosa) and contains many valuable hints as to treatment. We have thus far read the books in this series with interest, and we shall watch carefully for future numbers.

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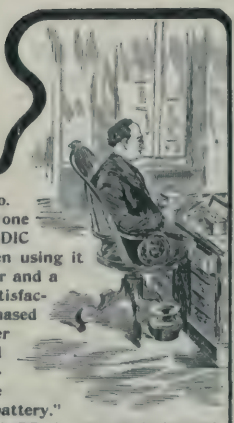

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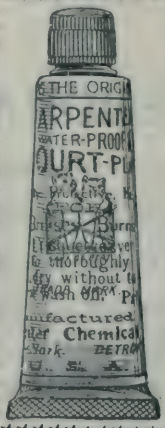

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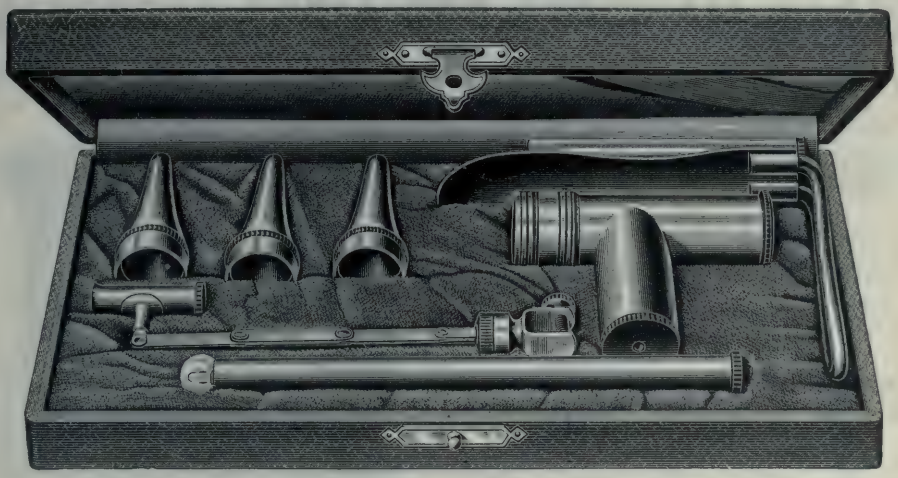

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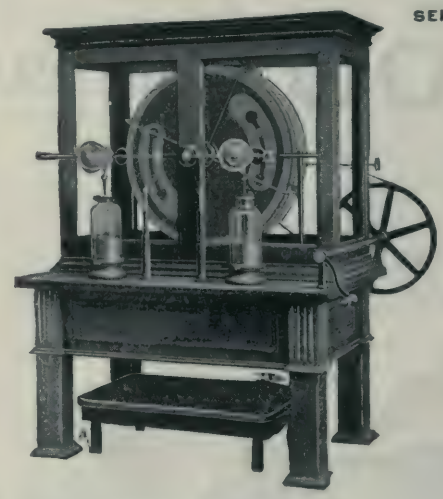

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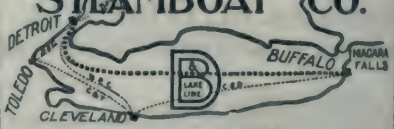

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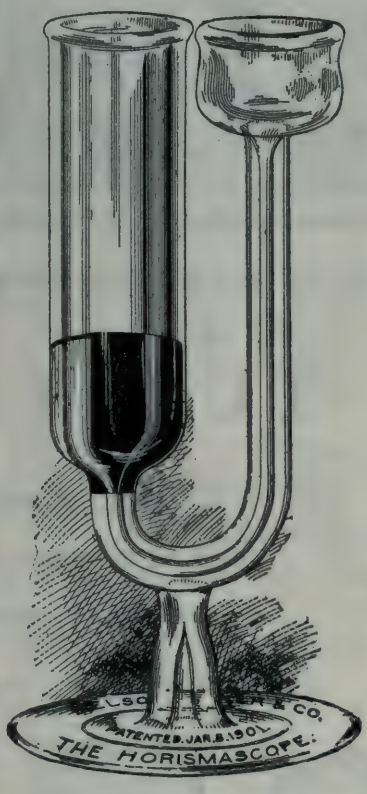

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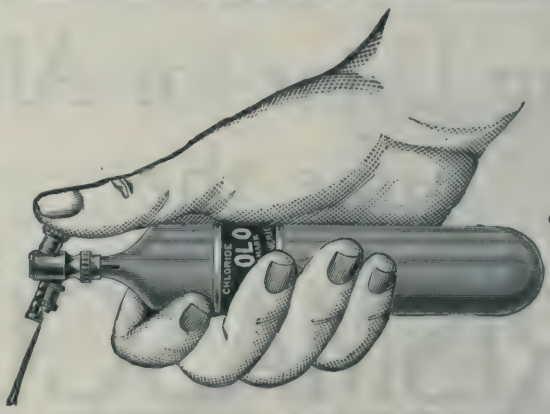

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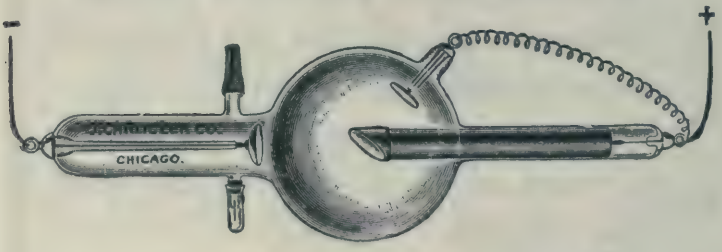

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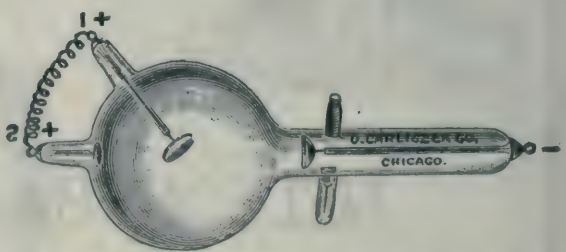

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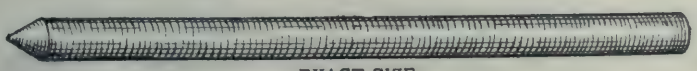

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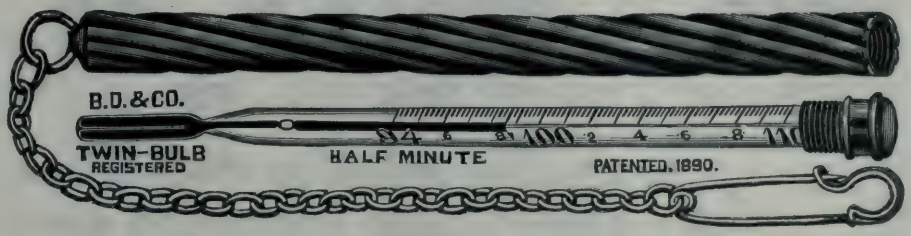

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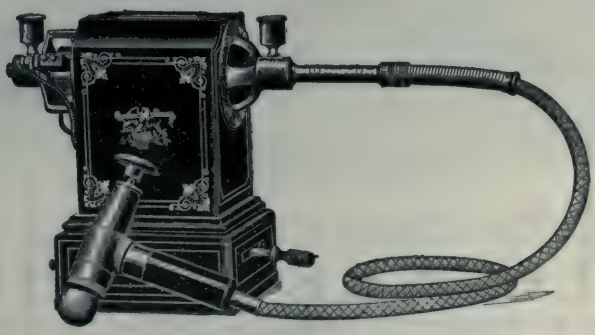

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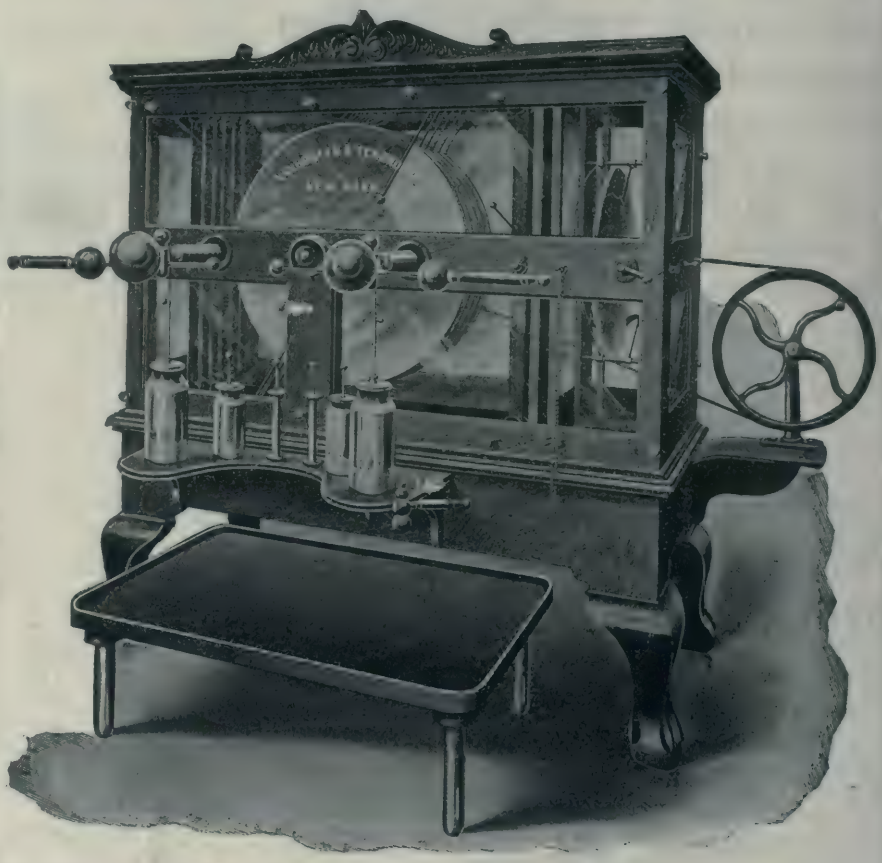

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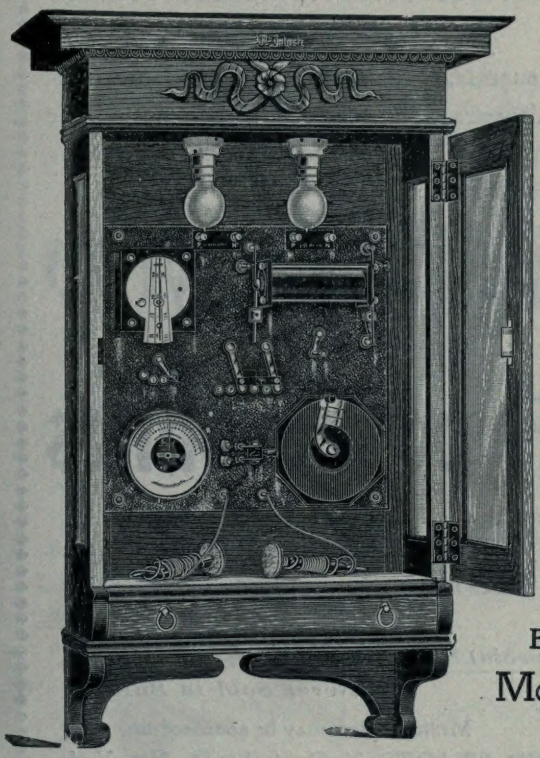

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Formerly Professor of Operative Surgery in the Kansas City Medical College and Professor of Surgery in the St. Louis College of Physicians and Surgeons.

Offers its wards at low rates to the doctors who are readers of the Detroit Medical Journal for the care of women who need surgical or gynecological treatment, yet who are not able to pay the high prices of other hospitals and sanitoria. There are A FEW FREE BEDS for cancer of the uterus or breast.

Maternity Department *The lying-in department provides for the care of Pay Cases only.* The utmost secrecy maintained as to the identity of Patients when required.

Those who wish further information concerning the Hospital, will please address

DR. EMORY LANPHEAR,
Chief Surgeon,
ST. LOUIS, MISSOURI.

JOHNSON & JOHNSON

LISTER'S TOOTH SOAP

JOHNSON'S BABY POWDER

JOHNSON'S BELLADONNA PLASTER

JOHNSON'S DIGESTIVE TABLETS

RED CROSS COTTON

RED CROSS GAUZE

RED CROSS LIGATURES

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QUALITY GUARANTEED

NEW BRUNSWICK, N. J.

Summer Complaint

LISTERINE

is extensively employed in the treatment of various forms of Diarrhoea occurring in children and adults. It is administered in doses of ten drops to a teaspoonful, as an antidote and corrective to the fermentative and putrefactive changes taking place in the contents of the alimentary canal.

In combating serious illness, it is doubly important to be assured that the patient is supplied with genuine **Listerine**, as the substitutes sometimes offered by the trade are generally of undetermined antiseptic strength and too often worthless for the purpose for which they are required.

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